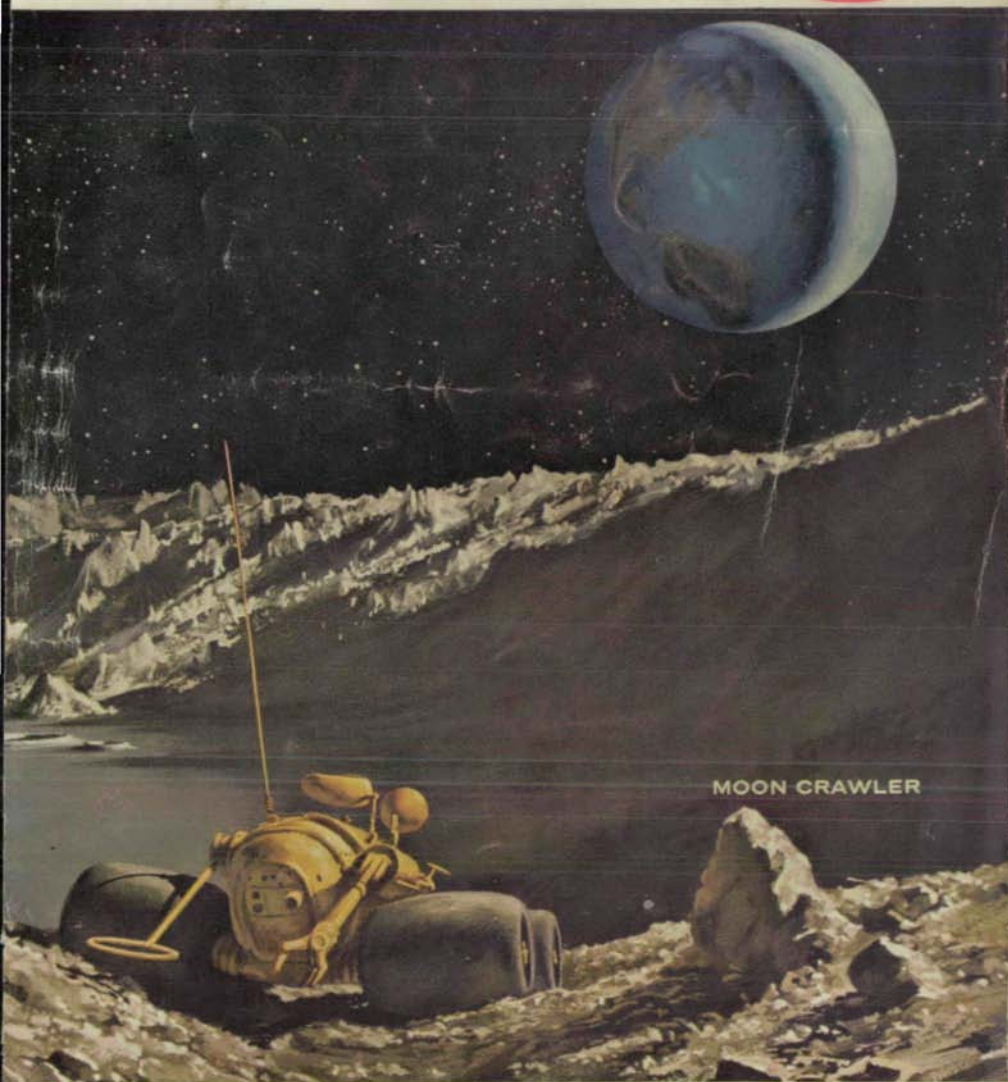


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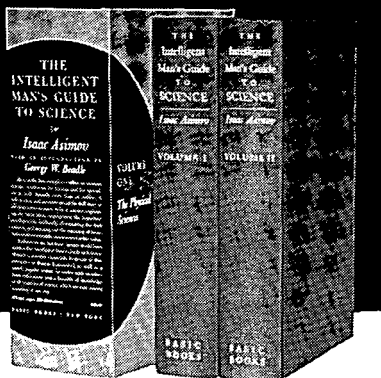


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ETHICAL QUOTIENT by John Phillifent

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VOL. LXX NO. 2 • OCTOBER 1962

Short Novel

Ethical Quotient, *John T. Phillifent* 6

Short Stories

. . . After a Few Words . . . by *Seaton*
McKettrig 62
 Gadget vs. Trend, *Christopher Anvil* 70

Serial

A Life for the Stars, *James Blish* 111
 (Conclusion)

Science Fact

Hypergolicity, *Edward C. Walterscheid* . . . 83
 Our Cover 110

Readers' Departments

Editorial Feature 4
 The Reference Library, *P. Schuyler Miller* 162
 Brass Tacks 170

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Crucial Experiment

■ The whole business of astrology and prediction of human affairs began, long, long ago, with weather prediction. That the general trend of the weather in a given latitude and longitude can be predicted astrologically is one of the first scientific discoveries of Mankind. In other words, the climate of a place definitely does depend on the position of the Sun with respect to the stars—a phenomenon commonly called "seasons" today, but just as mysterious, ten thousand years or so ago, as the phenomenon of burning rocks . . . the black kind.

Any group of men, having discovered a phenomenon, has a deplorable, but seemingly inevitable, tendency to try to explain everything with their new discovery—which overenthusiasm usually leads to sheer nonsense, and rejection of the real values. Like Dr. Mesmer's discovery of hypnotic effects, which, because of exaggeration, were rejected *in toto* for years . . . and only recently are being reaccepted and properly developed.

Astrologers "went ape," claiming far too much for their discoveries—with the result that much valid material has been rejected, just as Mesmer's actual and valid work was rejected.

So . . . let's do a recheck on some of the astrological discoveries, and check objectively. The anti-astrology forces make the nonsensical and irrational claim that "it's all nothing but coincidence!" That's nonsense because the original claims that the motion of the Sun into various constellations correlated with climatic phenomena was strictly an astrological proposition. And is absolutely one hundred per cent valid, of course. Sure . . . I know we know now *why* that works. But *that* it worked was just as true when it was an astrological mystery as it is now that it's

called "an astronomical fact." Changing the name of a real phenomenon doesn't change its descriptive nature! Oxygen, to Lavoissier, was a set of describable properties—not a structure of neutrons, protons, electrons, and assorted hypothetical subnuclear stuff. He could and did describe *what* it did, without any knowledge whatever of *why* it did.

To hold, as the anti-astrologers do, that there is *no* sense or truth in astrology is as irrational and unrealistic a viewpoint as to hold, as the astrological crackpots do, that *all* astrological "predictions" are absolutely infallible.

Description-and-observation must precede understanding and explanation. So . . . what more can astrology describe-and-observe in its original field of one hundred per cent success—weather prediction?

I've got to fight an irrational orientation that afflicts ninety-eight per cent of all science-oriented people these days—the concept that *only explainable knowledge is true*. That is was, and always will be one hundred per cent false. That I can smell is true; I can't explain it, and neither can anyone else. That a dog can smell far better than I is also demonstrable . . . and unexplainable. That an electron has a charge is demonstrable . . . but no one can explain why. "It just does!" isn't an explanation—it's an assertion.

Unexplainable knowledge—the simple observation-of-fact—is the fundamental truth; explanation is a handy cross-indexing, very useful, but having nothing whatsoever to do with Truth or Falseness.

The following astrological-based weather predictions go much, much further than those earliest of Man's astrological weather predictions—"When the Sun is in Gemini, the days will be long, the nights short, and the weather will grow warmer, in all areas north of the Equator."

Mr. Joe Goodavage has gathered the data, and prepared the predictions published herewith, in two ways: 1. By an astrological method developed by an astro-meteorologist. 2. By a roulette-wheel random method.

The second method is included in order to have a *true* coincidence test. Anyone can say "That's just coincidence!" after the event. Fine—let's prepare an honest-to-God, no-kidding genuine coincidence test. The roulette-wheel system uses random variations within limitations—it's not completely random. Point Barrow, Alaska, might hit -60°F . in February, and Death Valley, California, might hit 140°F . in August—but to interchange those temperatures, with Point Barrow at 140°F . in February, and Death Valley at -60°F . in August would not be merely random—it would be fantasy.

Take the seasonal mean temperature of a given place, at a given season; add a randomly determined number plus or minus, (*Continued on page 175*)

Ethical Quotient

The trouble with intelligence
is that it can't really believe in stupidity—
and with ethics, that it can't really comprehend
viciousness without direct experience!

by John T. Phillifent

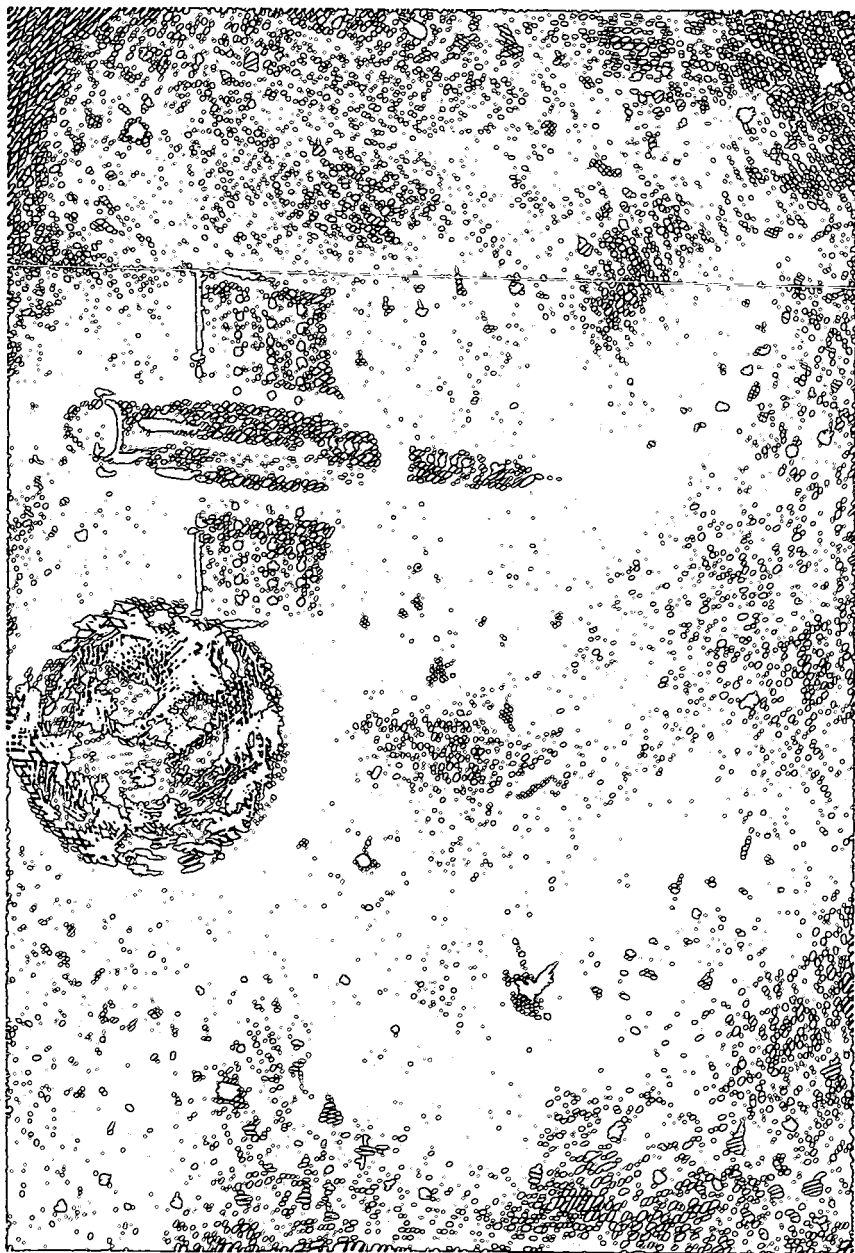
Illustrated by Schelling

■ Gordon Spencer sat up on his bunk with a stifled sigh. For more than an hour, now, he had been trying to settle down to sleep. A glowing dial on the bulkhead warned him that one sixth of the rest period was gone. The ship around him was quiet, silent but for the hardly-heard mumble of power. But his brain seethed with nagging, unanswerable questions. The cabin, the very bunk itself, posed one set. This was luxury, far beyond anything he had ever wanted, or been able to afford—but it was more than that.

At his first despairing sigh, and wriggle to sit up, it had shifted its

contours to assist him. Had he wanted to go farther, to swing his legs over the side and get out, it would have tilted, obligingly, for him. In the same moment, the cabin lights would have glowed into discreet illumination, and the deep pile rug on the floor would have warmed to greet his feet. If he had then stood up, the bunk, if he had wanted it to, would have folded itself neatly away. Spencer knew all this, because he had tried it out.

And this luxury—almost dream-like, to Spencer's way of thinking—had been provided for him without request, and without argument.



His discreet inquiries had told him that this cabin had been booked, for the trip from Hanlar to Chaldun, by some merchant-tycoon or other. In Galactalk it translated out as a "High Born," or Prince, of the Ferl, who ruled this sector of the Galactic Federation. Yet this eminent person had immediately surrendered his booking, had changed his own schedule, to oblige Spencer, whom he had never seen. And this was only the pale fringe of the incredible.

He, Gordon Spencer, an obscure and non-aspiring science-historian, thirty-five, unmarried, unambitious, unpretentious, was sitting here in a luxury cabin, in a luxury warp-ship of the Ferl, arrowing its way deep into the heart of the Ferl sector, many hundreds of light-years from his home—all without cost to himself, or any Solarian institution or association—and he was being treated as an honored guest. It was fantastic. He said as much, aloud, into the dimness of the quiet cabin.

"This is fantastic. It is also ridiculous. All this, just because I was lucky enough to guess the right answers to a quiz game?"

At this, his innate honesty put up a gentle but firm correction. It hadn't been quite *that* simple. Nevertheless, that silly quiz had started it all. He leaned back against the obliging bunk-bed, crossing one knee over the other, and groped for a cigarette. Then he remembered that he'd put them

away in a drawer, in the table which had, since, withdrawn into the wall. He got to his feet, padded across, and the table slid out to meet him, opening its drawer and offering a light, all ready. Back on the bunk again, he grinned, wryly, into the gloom. This cabin was well-nigh human.

He'd heard of psionics, on an academic level. Fringes of rumor had come his way, along with the occasional paper on the theory of it. He knew, also academically, that what was a half-scorned rumor to Solarians was an everyday commonplace throughout the whole of the galaxy wherever humanoid life-forms were found. In Galactalk, it was "personal-energy-control." But to meet it in practice, to be immersed in it like this, was a different order of things, was slightly unnerving. His fingers went, self-consciously, to the almost invisible bulge under the skin of his right temple, where a micro-miniaturized device was concealed, and he recalled his conversation with Captain Wakely, at the jump-off outpost on Ganymede.

"Beyond this point, Spencer, you're in Galactic territory" Wakely had said, crisply. "Who you are, where you're bound, why—those things don't concern me—have been taken care of by other people. All I need to know is that you're cleared, that the Galactics are giving you the veep treatment—which is very nice for you, but none of my affair. But you are still

an Earthman, and that is very much my affair." The immediate effect, Spencer had learned, was that he would have to endure a delicate operation on a tooth, a bit of minor surgery to the side of his head, and absorb some crucial advice. Wakely had supplied the last item.

"Think of it this way," he had suggested. "Out there, you'll be on your own, among people who look a lot like us. But they can, they do, and they have been in the habit of doing, for centuries, things which look like magic to us. They don't shake hands when they meet, as we do. You know why we do? It's a hold-over from the past, when you needed to be able to weigh up the strength of the possible opposition, and hold him still, at the same time. And we still do it. But they shake minds. They reach out and 'feel' each other. Also, they open doors, switch things on and off, run power-units fast or slow, and manipulate objects—that kind of thing."

Spencer had been sensible enough not to interrupt, although Wakely was not telling him anything he didn't already know. The captain had gone on.

"Now, you have to be protected against that, for a start. This gadget will take care of it for you. The tooth has a three-position switch. Off . . . one . . . two. Off, and you're normal, defenseless, like any other human."

"They could read my mind, do you mean?"

"No. That's one bogey nobody has to fear, after all. Putting it very simply, reading is reading, no matter how you do it. And Greek is greek, if you don't understand it. But they can, and would, catch your emotions, feelings, reactions—that level of thought. And influence them. Also a certain degree of physical control is possible. They could hinder your movements, slow you down. So, you move to position one and you are blanked off, totally, so far as they are concerned. Nothing for them to touch."

"I see!" Spencer had been interested, now. This was something definite. "At position one, I would be just not there to them, on a psionic level? Wakely's eye had gone bleak, suddenly.

"Right!" he had confirmed. "You catch on quick, mister. Now, do you mind telling me how come you're so quick with the psionics? I don't recall mentioning the word!"

"The history and philosophy of science is my field," Spencer had explained, hastily. "I've heard of this kind of thing. Nothing as advanced as this, of course. But I've heard of it. What puzzles me is—if you have this thing developed to this degree, why isn't it more common? Why all the hush-hush?" It had been a naïve question, nicely calculated to reassure Wakely, and set him off on an explanation, most of which Spencer had guessed, anyway.

"Position two gives you an imi-

tation of the kind of thing the Galactics can do—object-control—pick-up and transmission of emotions. It's not the same as theirs, so far as we can tell. Think of it as being on the order of trying to pick up AM broadcasts on an FM set and you have an idea. But this gadget, mister, is about as hard to get as a permit to enter Fort Knox with a bag. You have to be the right sort of person, just to get to know of its existence. You're getting it just because you're going out of the system. When you come back, you won't get any farther than this, *with* it. Every man on this outpost wears a shut-off model, but there are very few who ever get to wear the Mark II that you have." His expression had gone even more bleak.

"Just try to imagine what it would be like if a thing like this was let loose to every Tom and Dick. You'd have shambles; in a hurry. And I'm not just thinking of the criminal element, either. That thing spells 'power', the power to control and enslave. It could knock a man right off balance. Even a good, honest man."

Spencer nodded to himself, in the dark. Wakely hadn't said as much, but had inferred that such power needed its own ethic. And ethics had been a fadword, for a while, when the Solar worlds had learned that it was highly valued throughout the rest of the galaxy. For a while, it had caught on, become a "gimmick." Hence the ridiculous

quiz that had started everything. But, where the fad had run its course and died out, speeded by the realization that you can't, in the nature of things, win big money prizes for being "ethical," the effects of that first quiz had gone on snowballing, for Spencer.

He muttered. "Who'd have dreamed it would come to anything like this." He had been on position two ever since he'd reached the solitude of this cabin, in an attempt to gain familiarity with the power. He got to his feet again, "wanted" the bunk to flatten itself out and slide into its recess. He "wished" the cabin lights into brightness, and dim again, adjusted the air temperature, even wished the door open, all without moving a muscle. Cold logic told him that there wasn't a lot of power involved, not in the sense of moving mountains. This wasn't that kind of power. It wasn't free ergs from thin air. It just enabled a man to employ his personal quota of energy, to apply the tug of a hand or the pressure of a finger—at a distance—just by "wanting" it. The same cold logic told him that this was only a degree more weird than the actual fact of a "want" making his fingers splay out, or knot into a fist.

But, cold logic or not, it was a weird sensation. As Wakely had said, this kind of thing could knock a man off balance. It was tempting, and frightening, at the same time. He shivered, and "wished" the door shut again. This kind of thing

shook one's ideas about privacy. It was no longer just a matter of keeping other people out. You needed to be able to keep yourself in. When your thoughts, pictures, emotions and urges were impotent within your own skull, you could let them run. But when their effect was extended outside your own skin, that was a new kind of responsibility. You needed control. And it was difficult. Spencer frowned as he began to realize just how difficult.

Sinkingly, he thought "If I can't take charge of my thinking, here and now, in this privacy, what chance do I have in company?" He moved his tongue, to set the switch to the "blank" position, where it had been, safely, from the time he had left Wakely on Ganymede, until reaching this cabin. "Psionics is not for me," he decided, "not on any level." But, before he could shift the switch, he felt a sudden sharp-edged touch of menace. It was so vivid that he whirled, ducked—and the cabin lights flared . . . all in one swift reaction.

But he was quite alone. Relaxing, he frowned again, trying to sort his impressions. Somebody yearned to commit mayhem on somebody else, that much was sure. And not too far away, either. But it couldn't be anything to do with him, surely? He must have eavesdropped into someone else's problems. The question, now, was—

what did he do about it, if anything? Did one interfere in someone else's quarrel? That "feel" came again, stronger, and he revised the word "quarrel." By the impact of it, nothing less than bloody murder was being planned.

But, he reasoned, standing quite still, whoever that was intended for must surely be able to detect it? Unless, of course, he was asleep, or doped, or handicapped in some other way. Fascinated in spite of himself, Spencer "wished" to home in on that ferocious thought, to know more of it, shutting his eyes to aid concentration. He cringed a little as the thrust of hate became a mental shout. But it wasn't hate, at all. It was the blind unthinking "feel" of somebody under orders, and rationalizing them, who was saying to himself: "He is to be killed. It is for the best." Not an honest fire of rage, but the dim reaction of a stupid servant. Or—it could be there were two of them. It felt like it. Gaining facility, Spencer began to gather a picture of the victim. It clarified, suddenly, and he was watching, as if through a distorting lens, the spaceport at Hanlar, the warship gangway, the thin stream of passengers going aboard. One figure highlighted—one oddly incongruous, hatted and sober-suited figure, among the colorful flamboyant rest. One lone Earthman.

"Me?" he gasped, as the mind-picture wavered, shifted through a closeup of his own unremarkable

features, to a dim-lit view of a corridor, and the door of a cabin. This cabin. "They're after me!" he breathed, not wanting to believe it, utterly baffled as to why, but unable to argue with what he had "seen." All at once, he felt vulnerable, and foolish, standing there in just the nether half of his plain and unbeautiful pajamas. Scream for help? He didn't know how, and dismissed the thought. With it went all his puzzlement and unbelief. Personal danger drove all else into second place, sharpened his attention to immediate matters. How many? Two. What, exactly, did they have in mind? He got the convincing impression that each was carrying something which equated with "knife."

He glanced round, urgently, seeking something to swing, to wield, to hit with—but there was nothing. This was one class of luxury the cabin did not have. In desperation, he "wanted" the top quilt of his bunk, and it wrapped itself, obediently, around his left forearm. Something, but not much. He wished the cabin into darkness, and felt a stab of dismay. It would be the acme of insanity to confuse himself with his amateurish psi-powers at a time like this. He couldn't hope to compete, on that level. Flipping the tooth-switch to a safe "blank," he slid to the wall, flattening himself alongside the door, and tried to iron out the tension of waiting by controlling his breathing. He might be outclassed

on a psionic level, but, in a staid and uneventful life, he had made something of a fetish of physical fitness, often to the amusement and gentle ribbing of his colleagues so the thugs were not going to have things *all* their own way.

The moments seemed to crawl, and he found time to wonder what this was all about. More importantly, "who" had given the order. Who wanted him killed, and why? Then the door sighed, and a thin thread of light showed from the corridor. He readied to chop down on the arm moving that door, and remembered, just in time, that there need not be one, that the person moving that door might be all of a foot away from it. The door slid wide, a dark bulk showed, came through, moving none too quietly. He caught the glint of a bright blade, and a second shadow. There was a sheen of light on yellow skin. These men were about his own size, and kilted to the knee. That meant they were servant-class. And they were heavy-footed and careless. Overconfident. As the second man came clear of the doorway, Spencer reached out, tapped him on the shoulder.

The intruder jerked, swung round, to meet a right-handed smash that had traveled all the way from the wall, with all the hit that Spencer could pack into it. Shaking his arm, filled with an unholy joy at the sweetness of that punch, he stepped back to the wall again, plus a knife. The handle felt odd, in his hand,

but the odds were considerably more even, now. He saw the leading thug pause, spin round, and almost stumble over the prone figure of his companion. Then the lights blazed, the door hissed shut, and Spencer was face-to-face with deliberate murder.

The yellow man betrayed only a slight oddness about his shaven skull and the set of his eyes to mark him as other than Terran. Physically, he matched Spencer's six-foot height, with possibly a slight advantage in reach and weight. And he had psi-power. Spencer hunched himself, anxiously alert for anything, trying to read that dull face. It was a mask that told him very little. The man stood heavily, flat-footed, as if unready and, surprised. Then he lifted his knife hand. Spencer swayed. Suddenly, with no muscular cue, the nine-inch blade darted, like an arrow of light, and Spencer snatched up his quilted arm to fend it off. The blade sliced into the quilt, burned his arm, and half-an-inch of it bit into his forehead.

Blinded with the pain, Spencer grabbed for the weapon, got it. Then both knives, in his hands, jerked to be free. Only just in time, he slapped his hands together and squeezed, getting them apart with a squirming knife firmly gripped in each. For a moment, it was muscles against mind-power, and muscles were winning, but it was only a shred of consolation.

"This is crazy," he thought, desperately. "I'm no knife-artist. I have to eliminate these, somehow." Pressing his back to the paneled bulkhead, he clutched the two writhing weapons, and stabbed back and down, so that they were jammed into the hard wood. Then he went forward again, caught a flicker of surprise on that yellow face. "Slow on the uptake," he thought, with rising hope. Then the quilt on his arm went crazy and whipped itself up, over his face and head, smothering and blinding him. Snatching frantically at it, he caught a brief glimpse of his opponent coming forward, and barked in agony to a vicious kick in the belly. He went down in a knotted heap, whooping for breath, and was just able to ward off the next kick, to roll with it. The quilt began to wrap itself around his neck. Desperately, he flicked his tooth-switch to control, ordered the quilt to lie down and stay down. Up on one knee, he ducked away from a mighty but unskilled swipe from the enemy, and managed to stagger to his feet. Backing up, he pushed away the first feeling of despair. How could a man put up a decent fight, when the odd items in the environment couldn't be counted on to stay put?

The yellow man came forward, heavily, launched another kick, telegraphing the movement all the way. Spencer swayed, lashed out a chopping right, and his opponent staggered, off-balance. Stepping in,

Spencer slammed him upright with a left, smashed across a right, and swayed back. The yellow man, reeled, glassy-eyed. "That shakes up your psionics I'll bet," Spencer thought, grimly. The thug reeled back, dazed but game, putting up his arms in a clumsy guard. Spencer brushed one arm aside, easily, hit him once . . . twice . . . with the ache in his belly to add fuel to the punches . . . and it was all over. He stood, flexed his stinging knuckles, and then stepped heavily over the two bodies, called out his bunk, sat on it, and panted, rubbing his middle. On a sudden afterthought, he moved his tooth-switch to "blank." And wondered what he ought to do, now?

"Excuse, please, if I intrude," came a voice, soft and melodious, in careful Galactalk. "I felt pain, distress, and trouble. Do you need help?"

He looked up, hurriedly. A girl—or a young woman, he couldn't be sure which—stood in his doorway. Her golden hair gleamed in disarray around an elfin face where dark-blue eyes watched him in wide curiosity. The rest of her was hidden in a cloud of mist that was all shades of restless green fire.

"I'm sorry—" He got up, awkwardly and embarrassed, feeling for the right word-sounds. Galactalk was poorly equipped for delicate nuances. "There has been trouble. These men came to attack me. They had weapons. I do not know why,

nor what is the approved next action." Her eyes had been active during his halting explanation, but were now back on him, and with a sudden understanding.

"Of course—" she breathed, in a subtly different tone. "I am sorry, I was still half asleep. You are the Solarian Great One, the Ethical Absolute. I should have known. My cabin adjoins yours. Please command me. The distress and hurt could not have come from you, because all know that Solarians are . . . deficient." She gave the word an inflection of delicate distaste, hurried on, "It must have been from these, when you struck them down. But you *are* injured." Suddenly he was aware of the sticky trickle of blood down the side of his face, and from his arm.

"It is trivial," he mumbled, also becoming aware of his half-nakedness, his pajamas, his bare feet. "These are more important, surely?" and he nodded to the two bodies. She became brisk.

"I will see to everything."

Within seconds his cabin was invaded by competent and helpful people. A gray-skinned, placid-faced, medical attendant dealt with his cuts, sealing them with quick-drying spray. The duty officer, grim-faced, stood by while crewmen seized the two bodies and removed them. And their knives. Spencer had a moment of intrigued wonder, as he pictured the task of securing a man who has psionic ability. The brig, or its equivalent,

would have to be something really special, he thought. Possibly with a locking system designed to operate only on a private code of thought-patterns—or to a certain brain-pattern, even. The officer himself lingered only long enough to be sure that Spencer was comfortable.

"All will be dealt with, immediately after the rest period," he said. "They will be put to the question. You need trouble yourself no further. I hope you will sleep well, now . . ." and he finished on a word which sent Spencer groping through his Galactalk vocabulary vainly. The intergalactic language was a minor interest, on Earth. Spencer had acquired what little he knew out of a necessity to be able to read the few scientific papers which filtered in from outside. When this trip had become a possibility he had made efforts to brush up on it. But that word had him stopped. He turned to where the girl sat on the bunk, discreetly distant but attentive.

"I am grateful," he said. "May I know your name, to thank you properly? Mine is Gordon Spencer. Of Earth, as you seem to know already."

"And *what* are you?" she asked, curiously. "What is your function?" This was another stopper, as Galactalk had no precise synonym either for "history" or "science." The nearest he could get to history was "that which has happened." Science, all science, in Galactalk, was subsumed in a word

which meant "cosmology." There was a deal of philosophical truth in that, Spencer thought, but it didn't help in translation.

"I teach," he said, "or, better, I make programs for a machine to be used by those who wish to know just how the Universe came to be the way it is, and how much we know about the process." Her eyes rounded.

"This is a work truly befitting a Great One!"

"I'm no great one," he denied, hurriedly. "On Earth I am of little importance. Such activities are of minor value and there are many hundreds of thousands equal, or superior, to me."

"I do not understand this," she shook her head, "although I know you speak true, being Ethical Absolute. Still"—she made a tiny gesture of amusement—"there are things I do not yet understand."

"Myself, also," he said, feelingly. "But you have not told me who you are."

"I am Delyra Taynee. As yet, I have no function. This was my father's cabin, and he should have traveled in your place. I have been thinking that this accounts for your disturbance. The attack was meant for my father, not for you." Spencer bit back his denial of this. He knew different, but he couldn't say so without disclosing just how he knew, and he wasn't ready for that, yet. Besides, he had just caught on to a clue to something else.

"Your father," he murmured, "is a personage, as I understand it. Excuse my awkward words, but he would be called 'noble,' I think? High-born? Then you, also. You are a Princess?" She nodded, gravely. "Then I know, now, what the duty-officer meant. He called you 'Highness'. I am honored, and very sorry that I have caused you such disturbance." She eyed him with a delicate frown, then shook her head.

"Again, I do not understand. The officer was speaking to you. I am of rank, it is true, but through the blood and by material possessions only. You are Ethical Absolute. You are the Great One, the Highness. The honor is mine." She frowned even more deeply at his involuntary gape. "You did not know this? Yours must be a strange world, indeed. See now, in all the galaxy of people such as we, there are great numbers, beyond counting. Of these there are Ethical Absolutes, like you, only one in every million of millions. This is a truth that all children are taught. Think . . . all on this ship . . . in Hanlar, whence we came . . . in Chal-dun, where we are bound . . . all who have seen you . . . they will count it a great thing, to speak of to less-fortunate friends. Now do you understand?"

"I hear your words," Spencer mumbled, "but they do not make sense to me. Look, after the rest period there will be some time before we arrive. You are the first

person I have met"—he managed to catch the correct personal-formal inflection—"so I would ask you to join me for—" but now he had lost the word altogether, so substituted, hastily—"for the first meal. Will you? There is so much to explain."

"It will be a great honor."

"No, not as an honor," he objected. "As a gesture, to me-as-a person?"

"That, also!" she smiled. "I will come for you."

Leaning back on the bunk, after she had gone, he wished, belatedly, that he had asked the medico for something to quell the headache he could feel beginning to swell behind his eyes. But perhaps these people could dismiss a thing like that with a thought? He moved his switch, tried it, and wished he hadn't. The dial on the wall indicated a third of the rest period gone. He needed sleep. It occurred to him that a well-appointed cabin ought to have something to take care of such things, so he "ached" his head—so successfully that it made his scalp tighten—and a panel slid back. He hadn't seen this one before, but the shelf full of bottles was unmistakable, even at a distance. Drinks. Wrong signal, he mused, unhappily. He didn't want a hangover. Just the opposite.

All the same, he went across to it, stooped painfully, and peered at a cluster of smaller bottles, each

labeled. Fortunately, chemical formulae followed the same logical system, here, as on Earth. Only the symbols were different. He translated, laboriously, through a headache that was excruciatingly genuine, now. Eventually he found one bottle, translating twice to make quite sure— $\text{C}_2\text{H}_5\text{O.C}_6\text{H}_4\text{.NH.CO.CH}_3$ —aceto-p-phenetidine—phenacetin. That would do him very well.

Back on the bunk again, he tried to relax. What had been bewildering before was now explained, but the explanation was worse than the puzzle. He had her word, and her obvious sincerity, that he was a Great One, an Ethical Absolute. She believed it. By the evidence, so did a whole lot of other people. Ethical Absolute. One in a million of millions. The words rolled in his mind. He tried to view them objectively. Whether they were true or not was beside the point. What mattered was that "they" accepted this, and gave him honor as a consequence. He tried to feel great, and worthy, and the attempt was a miserable failure. He still knew himself as ordinary and unspectacular.

Then there was that delicate hint of hers, that he was a freak. Well, deficient, anyway, like all Solarians. He seized on that, followed it back in his mind, curiously—ten years back, to First Contact. Captain . . . later major . . . John Field, and his hand-picked international crew of six, making the very first interstellar jump, with the

first, primitive but workable, star-drive. Then their return, and the stunning news. There were people out there, by the myriad. Civilizations, races, systems, cultures—so many as to stagger the biggest imagination, and all peacefully and freely interlinked in a loose framework of trade and commerce. A galaxy-wide Federation, many hundreds of centuries old.

Were they interested in us? Mildly. Not very much.

What were their aims, their objectives, their motivations? None, save a mild interest, friendly neutrality, and a willingness—nothing more—to trade and exchange, on a material basis.

But what about their cultures, their technologies, the great scientific secrets, the social advances, the treasures they might have—must have—what about them? What did we do now—tremble? Or exult? Or what?

Spencer could recall, almost word for word, the public answer John Field had made to that question.

"They class us as a lesser culture. With respect, but primitive. Not important. Their values differ in many ways from ours, which is not surprising. But we were given to understand that we would not be interfered with. They respect our right to do just whatever we please, within our own system. Beyond that, though, we would have to ask to be admitted, on a low level, as a member of this sector of the Federation. Under the managership and

control of the particular Overlord of this sector. Known as the Ferl. So far as we could make out, the Ferl control, directly, some fifty-odd planetary systems, all bigger than ours, and are administratively responsible for some five hundred more. Also, as far as we could discover, this Overlordship is benevolent.

"But, if we wanted any part of it, we would have to ask. And qualify. And agree to their management—on their terms. I consulted with my colleagues, but it was obvious, to me, at least, that my duty was to tell them that, we of the Solarian planets, if we *had* to make the choice between submitting to alien domination, no matter how, or what the material gain—between that and the freedom to go our own way, in our own way—then we would choose freedom. That was the answer I gave. I did add that we were not an authoritative body, and that if the folks back home didn't endorse that, there would be another ship making the trip, to talk business. But I had no doubt, in my own mind!"

Brave words, Spencer mused, sleepily. And John Field had judged rightly. His choice had been endorsed by every responsible Solarian body that could get a hearing. There had been a few heretical voices, a scientist or two, a few sociologists, a handful of adventurous spirits, to mutter a protest. But the great mass had been unanimous. It wasn't the first time Man

had had to rescale his yardstick of values. Once, Earth had been the center of the Universe. Then it had been demoted to just one of a system of planets, with Sol as the center. In its turn, Sol had shrunk to just a minor star among many millions, a speck in a galaxy. And the galaxy itself had become just one average specimen among many millions. And none of these changes in perspective had affected, in any way, the everyday problems of living. People ate, slept, fought, and tried to plan for the morrow, just as they had always done. Thus it was no effort at all to relegate the stupendous Galactic Federation of alien humanoids into the same limbo of incomprehensible academic things. The stars didn't look any different, did they?

A small outpost grew up, on Ganymede, built with Ferl cooperation. There was a very small trickle of two-way communication and information—nothing shattering. And that was all. But Spencer was groping for something else. Something important—

He woke to the sound of a gently insistent gong-with-bells—a sound so pleasant that he lay a while to listen, and was thus wide awake when he sat up. And he had it. His subconscious had rounded up the missing item while he slept. The lucky charms! Field and all his crew had worn good-luck mascots of a special kind, had even wanted to call their ship the "Lucky

Charm" instead of the official "Stellar One." Only a handful of people knew why.

Spencer rolled out of his bunk, yawned, "wanted" a shower and shave, and went, almost unthinkingly, to the stall which opened out for him. He was steamed, oiled, sprayed, massaged and depilated, delicately and in comfort, the while his mind dredged up old half-forgotten references. Psi-phenomena, for instance. They had been studied, in a left-handed fashion, as far back as the middle nineteen hundreds, but all attempts to hammer out a workable theory had failed. On an analogy with sight, it had been the same kind of failure that would come from studying only the physical mechanism involved. There had to be a consideration of the personal factor involved. And this was difficult. Some progress had been made, a few minor factors established beyond doubt. One was that mental power, personality, character and dominant emotions were all interlinked. Another was that the influence of the "person" undoubtedly extended beyond the barriers of his skin. Or, in more effective terms, a man operating a machine could, and did, have an effect on it, over and above the control movements he made with his hands, or feet.

This distinctly uncomfortable truth became crucial during the construction and trials of the first star-drive. Time and again, things went wrong, components failed,

blew out, reversed function, or just went insanely unstable, against all reason. The point was reached when the whole experimental team, in their out-of-harm's-way Lunar Base, were good and ready to quit. In sheer desperation, the authorities heeded the words of a dedicated group of psi-believers. They couldn't do worse than fail. They might, just, succeed. So the "magic" men had swarmed into Star-base, armed with a jury-rigged theory compounded of equal parts auto-suggestion, witchcraft, voodoo, symbolism and pure guesswork, plus a passion for trial-and-error on a lunatic scale. They had begun by hexing every section, and then every component of every section. And the thin red line on the progress-flow charts had begun to take its first upward bend.

Now the magicians changed their tactics, and went for the key-personnel involved. Try a talisman, a mascot, a luck-piece—anything—just to see. And, more by feel than anything else, they evolved a luck-charm that worked. Not until long after was it discovered that the luck-charm effectively interposed a barrier between a man's worries, fears, nervousness—and the delicate and sensitive machinery he was working on. And the same barrier was a shield against the psionic Galactics those same men met, later. So it was that all Solarians were "known" to be deficient.

Spencer grinned to himself as he finished dressing, but the grin

faded as he looked ahead to the prospect of entertaining a princess in a public dining-place. That was going to be an ordeal. Belatedly, he blanked himself off, and then wondered if it would occur to her to wonder how he had managed to "operate" this cabin. This, he thought, grimly, was what happened once you started a falsehood. You had to go along with it, getting more and more involved. He didn't like doing it, but the secret was not his alone to throw away. Being ethical had its drawbacks, he mused, and managed to regain a wry smile. The cabin door slid open so smoothly, without warning, that she caught the grin still on his face.

"Why do you smile?" she asked.

"With my people," he countered, swiftly, "it is the custom to knock, to announce, before entering." She put a hand to her mouth in quick contrition.

"I am sorry. I did not know that. We secure a door with a 'do-not-enter' thought, if we desire privacy. A clear door is a welcome. I should have known it would be otherwise—"

"That's all right. My fault. I'll learn as I go. Now . . . breakfast?" He had recalled the correct word now, and gestured for her to go ahead.

"If it is your wish," she hesitated, "but . . . perhaps you would prefer to eat here? There will be many eyes, watching, out there. Here, is private."



"I'd like that," he admitted, "but I thought . . . perhaps—" He tried for a rendering of "convention," and floundered. She smiled, understandingly.

"It is the same, with us. But you are Ethical Absolute. So, it is all right, you see?" And she proceeded to take charge, without further comment. Spencer sat, watching, and thinking. It was all right, in her sense. He was Ethical Absolute—at least, he was known to be such. And that, in her culture, was good enough for her. He had to admit that it simplified things. That is, if you could accept as infallible the results of a quiz.

He let the ideas slip, and gave attention to the meal provided by soft-footed stewards. He cleaned his palate with an iced liquid that was acid-fruit; used ornate tongs to eat meat-chunks that were tender, juicy, and delicious; chewed a mouthful of blue berries that stung his tongue, and smoothed away the sting with a green cream that was as bland as a caress. And, surprisingly, he had had enough. Watching her, he had managed to avoid gross mistakes, but if she was deliberately cueing him, it didn't show. He could have used a cup of coffee, or something similar, but here his language failed completely. She knew of no equivalent. To her, it seemed, stimulants were in a medical category, to be taken only as needed. Giving it up, he got out

his cigarettes, offered her one. She refused, delicately, but inviting him to go ahead.

"A fine meal," he said. "I'm obliged to you. But I wish I knew what this is all about." She looked her puzzlement and he elaborated. "What am I supposed to be doing, here, and why? It is costing somebody a lot to get me to Chaldun. For what? And why me?"

"To decide, of course!" She said it as if it meant something. "You are to be one of a Great Five—five Ethical Absolutes—meeting to decide some great issue."

"But *what* issue? And how can I have an opinion on a Galactic matter? I've never been off Earth before. What would I know about it?"

"You will know the question, when it is put. And you will have a valid opinion, because it will be an ethical matter, and you—"

"All right," he interrupted. "Don't say it again. I wish it meant as much to me as it obviously does to you. All I did was to guess the right . . . the obvious . . . answers to a lot of obvious questions. That makes me a great somebody?" He aimed for a tone of chagrin, amusement and disbelief.

"You will see!" She was gently positive. "It so happens that I know what will happen to you. Our port of arrival on Chaldun is Pellau, a great city. My father's estate is on the outskirts. That is where the Great Five is to meet. We offered our hospitality, and it

was accepted. It is a great honor." He got up, restlessly.

"I'll grant you the honor part," he said. "That's your values. But why me? I'm no great statesman, or politician—" He left it there, because her face told him he wasn't getting across, at all. Changing the subject, he asked, "What's happening about the two assassins? Will I have to report to somebody?"

"I will inquire." She got up, went to yet another panel, which opened out to meet her, and spent a few moments in communication with someone. Then she was back, smiling. "Captain Elbet will attend you, at once." Spencer shook his head and stifled a sigh. Like it or not, these people were determined to treat him as an eminence.

Captain Elbet was short and thick-set, gray-skinned and with jut ears, his face rugged, his hair an astonishingly bright red. But his uniform gleamed and his manner was placatory.

"We put them to the question," he said, in careful Galactalk, "but, Highness, they chose to die, rather than speak, which is the way of such." He used the term which meant "self-death," and Spencer hid a twinge of distaste. Suicide, here, had a different value.

"What are the prospects of tracing them back, discovering who gave them the orders for what they did?"

"All is being done. They were a crew, taken aboard at Hanlar because of an accidental shortage.

Word has been sent to the Lord Taynee, there. He will, doubtless, press the matter."

"You're satisfied that it was meant for him, then?"

"But what else?" Elbet was shocked, his mouth pushing out in a gesture of distaste. "Not even subclasses such as they would offer violence to a Great One, knowingly. It was an error. I am greatly thankful that little hurt has come to you. Had you been seriously harmed, I should have been ruined, disgraced. For such a thing to happen, on my ship . . . it would have been very bad."

Spencer frowned. Could he have been wrong, after all? There was only that mental picture to go by. The other theory certainly made more sense. Perhaps Lord Taynee would turn up the evidence to decide it, one way or the other.

"All right," he shrugged. "No reflection on you, sir. I'm none the worse, so we'll say no more about it." The captain showed his relief, his gratitude, and something else. He hesitated, awkwardly. Delyra Taynee broke in.

"Captain Elbet is curious, Highness . . . and I, also . . . as to how you managed to overpower and strike down the two men. Both were armed, were strong. You were defenseless, and lacking personal-energy-control!" She said it very tactfully. Spencer eyed her, and the captain, and something began to be very clear to him, all at once. The word "compensation" came to him,

and he earmarked it for future de-liberation. He couldn't explain it, here. He had no way of explaining, at all.

"I took away their knives," he said, simply. "Then I struck them, thus . . ." and he made motions with his fists. "That was all." It meant nothing to them. Elbet withdrew, pleading the urgencies of approaching landing-time. Delyra made no secret of her bewilderment.

"You are a strange man. So many contradictions. Ethical Absolute, yet humble thinking. Deficient, yet powerful. Are all Earth people like you?"

"That's too big a question to go into, right now," he grinned. "If you don't mind, I'd like you to help me with a little experiment, though . . ." and it wasn't until after he had said it that he realized the possible ambiguity of his words. She never thought of it at all, but was immediately and unquestioningly interested. He picked up an item of tableware which was almost the duplicate of an Earth-type spoon, cleared a space along one edge of the table, and commanded her to watch without interfering in any way. Then, poising himself, gauging distances carefully, he snapped his palm-edge down on the tip of the bowl. The spoon flew in a twinkling arc, and he caught it, deftly. She was not impressed.

"All right," he chuckled. "Let's see you do it." She came round the table readily enough, set the spoon,

flicked her right hand negligently, and the spoon circled lazily, drifted down into her right palm. She raised her brows at him.

"That was just fine," he applauded. "Now let's see you do it again—but without personal power!" She looked at him again, with a new light in her eye. Then she stared at the spoon in her hand as if she had never seen it before.

"I think I am beginning to understand," she breathed, putting the spoon where it had been on the table. He caught his breath as he saw the green mist of her garment suddenly modulate into pale gray and cling close to her body like a furry pelt. It was obviously in tune with her thoughts and feelings. What a garment! No wonder she hadn't bothered to change from last night. She had a whole wardrobe, right there. But, as soon as she made a move to flick the spoon, the green flame-color flowed back, and the gauzy fronds lifted up. She tried three times, and stopped herself each time, shaking her head.

"It is difficult—to hold back," she confessed. "One does it from long habit, automatically. I will try it again." This time she set herself in pretty determination, chopped down with her hand, and winced as she caught the bowl too full. Frowning, she tried once more, and the spoon flew far beyond her reach. It fell almost to the carpet, then came swooping back, obediently, into her hand. She put it down on the table, ruefully.

"Don't worry about it," he consoled her. "It's natural for you to use what you have. As we might put it, why go blindfold, when you can see? But, you know, a child could learn to do that, and things like it, in no time at all, on Earth."

"It is important to you, Highness?"

"It might be, yes. But you can forget that 'highness' stuff. I answer very well to Mr. Spencer . . . or 'Gordon', if you could bring yourself to it." An urgent staccato chiming cut him short.

"It is the arrival warning," she said, unaccountably breathless. "You must rest, now, on your couch, until you hear a single plain tone. That will mean that we are secured. Then I will come for you, and arrange everything. Once we are berthed, you will be my guest, and my responsibility . . . Gordon!" and she was gone before he could find his tongue.

Stretched out on his bunk, he took time out to examine his chaotic personal feelings, and criticize them, severely. Get a grip on yourself, he warned. You're old enough to be her father, almost. All right, so this is the first time any woman ever made your heart stick in your throat, and your knees turn to water, so what? She's a princess, remember—a *real* somebody. And that light in her eyes could be just a reflection for your greatness. Right now it's fine. But what comes after? Back to the programming, the backwater—and forget all about this.

You couldn't offer her anything, except yourself. Yes, you're an ethical wonder-boy, here—for what it may be worth. But what does it cut up for, on Earth? And what does it mean, anyway, except that you're just naturally honest? You can't help it. It's the way you're made, isn't it? So how about being honest with yourself, right now—with her? Also, don't forget, you're a defective, so far as she is concerned.

By the time the "secure" tone was sounded he had himself well in hand, and allowed himself to be collected, entrusted his one suitcase to a green-skinned servant, was led to the gangway, ushered into a purring float-chariot, there to sit beside Delyra—all with carefully controlled civility. He paid polite attention to the sights as she showed them to him, and by the time they had reached the outlying districts he had come to the not-very-original conclusion that all big cities look very much alike, give or take a few peculiarities. Then her silence became so pointed as to penetrate his reserve. He met her eye, and looked away, awkwardly.

"You are cold . . . different, somehow," she said, candidly. "I have done something to offend you?"

"No!" he said, almost angrily. Never had he felt the language barrier as strongly as now. He had no

choice of delicate words at all. "Princess . . ." He hesitated, then, "Forgive me if my words are improper, but what I am to say must be said. As well as being a person of little importance, I am also old. Old, that is, to the point where a man should be mated and have children." She was quite still, now, only her eyes alive. "I have neither mate nor issue because I have little to offer a mate, and no great urge to exchange my freedom for . . ." he caught at that, hurriedly, and substituted, ". . . I have not yet met the woman who would be right for me. And I am almost past the age when I could hope to meet such a woman. Again, excuse my clumsiness, and please see me, not as someone great, but as a very ordinary man, ill-versed in the ways of attractive women, afflicted with very ordinary feelings, and trying very hard to keep them under control."

For a moment longer, she sat quite still. Their car was now gliding down a long avenue of high trees. They had just passed through a very ornate gate, so this, presumably, was the beginning of the estate. Light and shade fled across her face, and he saw that her dress was now glowing a dull golden color, rippling like a field of grain in a breeze. Then she spoke, softly.

"I understand, I think. Such things are different, with us, because we have no need for explaining. Words are difficult. But I can say this. I, too, am of an age for mating, but have not yet met the

right one. But, when you ask that I set aside your greatness, this is impossible. See . . . you are of such a height, such a weight. Your eyes are this color. These things are. So, also, you are Ethical Absolute. It is all the same. How can it be set to one side? And, truly, I am complimented, as any woman would be, that you have thought thus of me, and have said so!" Her dress flared into pink for a moment, then dissolved into many-greens as her mood switched.

"We are arrived!" she announced, standing up as the car stopped. "I will show you my home, and the room that is to be yours."

He scrambled out, offering his arm. They had halted at the foot of a white stone stairway, leading up to a facade almost Greek in its massive simplicity. Delyra went ahead, a nymph in a cloud of green flame, to greet a huge and smiling yellow man, then a trio of women, two young, one elderly. Privileged servants, Spencer guessed, and hung back, discreetly. She turned to hail him, all aglow.

"Good news, Gordon! Another of the Five is already here, an hour since. Now you will have someone to talk with, to answer all your questions. Come . . ." and she led him through a magnificent doorway into a huge hall mosaic-floored, and to another flight of stairs, this time in darkly glossy wood. Catching up with her, he protested, mildly.

"Am I so difficult to talk to?"

"It is not that," she laughed. "But Harly Thalog is a 'talker'. It is his function. You will see."

He was still trying to translate "talker" as she led him from his room along a picture-hung gallery, to a great oak door that had "committee room" built into its proportions. It swung open at their coming, and Spencer had a moment of qualm. This was where he came unstuck. This was the real thing. He went forward to meet the man who rose at their entrance. A burly man, three inches shorter than Spencer, clad simply in a blue velvet jerkin, leather-belted, and caught at the waist with a curious copper buckle—like an old-time huntsman. Dark leather sandals helped the illusion. But his complexion was glossy brown with blue shadows, and his scant hair, mustache and forked beard were all gleaming silver. He put out a hand in greeting.

"Good afternoon, Mr. Spencer," he said, deep-voiced and in flawless English. "I have looked forward to this moment. Welcome. Please take a seat."

Spencer met the handclasp automatically, swallowed his surprise and remembered his manners. "You're Harly Thalog, so Delyra told me. I'm honored, and a bit shaken by your English. I hadn't expected that."

Thalog brushed it aside, chuckling. "You would like some refreshment? Put my learning to the test . . ."

"I already know about coffee. That's out, isn't it?"

"I regret, it is quite true. No stimulants. But we do have euphorics. Whisky, isn't it? And effervescence?"

"Make mine straight. With water. Please." Spencer found a seat, and watched Thalog instruct Delyra. "You're some linguist, sir," he commented, as he found the synonym for "talker." "I feel even more of an impostor, now. I have no comparable talent, at all."

"That has nothing to do with it," Thalog explained. "I am a linguist, by function and training. Happily, when one knows how a man speaks, one knows also how he thinks, to a degree. Therefore I know that, to you, the ethical sense is an uncomfortable thing. Hence your feeling of not-worthiness, yes?"

"That's about it," Spencer nodded, thoughtfully. "With us, ethical values are hardly definite enough to be workable. Oh, we respect and admire an honest man . . . yes, but the solid credits, somehow, seem to go to other things, to a skill in some particular field, winning out in competition beating the next man to some goal, that kind of thing. That must seem irrational to you. It does to me, sometimes."

"On the contrary," said Thalog, "this is a logical outcome of the lack of genuine personal knowledge, and is common in a culture like-yours, where every man is an

island to himself. It is a stage which is left behind when the personal barrier is broken down."

"As a culture, we must seem pretty primitive to you."

"Only in that sense," Thalog smiled. "Not offensively. Ah, here come the drinkables."

Spencer accepted the tall glass offered him, watched Delyra as she settled on a cushion close by, and waited for Thalog to go on.

"A society, any society, must have a code," the burly man murmured. "If the society is grouped on a sight and sound level, the code must be one which can be put in words, seen in actions, measured by material things. Having no valid way of judging men as they are, it must go by what they seem, and do. And such a code, perforce, is static. But the society, like the individuals composing it, grows and changes, the code becomes ill-fitting, breaks down. The need for a code, however, is so urgent that another is formed. And so-on. I have seen this process at work, in your own histories, which I have studied. The result could have been predicted. The code, now, is so refined that no one can think of a better. Yet it is still irksome and restrictive. People chafe under it. But they dare not abandon it, having nothing to put in its place. Am I being too elementary?"

"You're making it sound simple, anyway," Spencer grinned. "Maybe I can go on from there. On your level, with personal-power, every

man can know his fellow man directly and positively—as he really is. So a stated, fixed code is no longer essential . . ."

"Now *you* are oversimplifying," Thalog chuckled. "But you have the general idea. The essential difference is that with us a man has no need for show, to amass great wealth, to perform great deeds—to demonstrate what he is. He just is, and we know." Spencer took a sip of his drink, which was excellent, and sighed, ruefully.

"Even that idea isn't new to us," he said. "We have had people, all down the ages, who felt that they could tell, somehow, whether a man was good, or not. Some of them, by all accounts, could actually do it. But we've never had it on any workable basis. It's difficult to imagine what it would be like, all at once. I take it you encounter . . . deficient races . . . like us . . . pretty often?"

"Ah, no. I didn't say that," Thalog leaned forward, interestedly. "We do run across undeveloped races. But all, so far, have had the power, in latent form. Where it is indicated, and appropriate, we admit them under supervision, and assist them to develop. It is a simple and quick process. But you"—he smiled, disarmingly—"you Solarians are unique. I know of no other culture, on record, which lacks the power altogether, like you. At this moment, for example, if I close my eyes, you are just 'not there,' at all. It is remarkable. And

all the more remarkable, if you will forgive my being personal, that you should be Ethical Absolute."

"No more remarkable than it is to me," Spencer shrugged, wryly. "I have already gathered, from the princess, here, that I'm deformed to her way of thinking. Not offensively, of course!" He glanced to where she was sitting, and was suddenly apologetic. "This must be dull, for her, not understanding a word we are saying?"

"But she does know, through me. That, too, is my function. Now, I am curious about you. Tell me how it is that you, alone, of the Solarian worlds, bothered even to take the higher tests?"

"This is where I give myself away," Spencer muttered, and took a good pull at his glass. Then, "How do you know so much about the higher tests?"

"I set them," Thalog explained, simply, "and thus I can assure you there will be no giving away, as you term it. Please go on."

So Spencer thought back, and told, wryly, of a certain day, four years ago, and of his colleague, Frank Wallis, who was forever amusing himself with tests, and quizzes, and crossword puzzles. Wallis, also, was a machine tutor, specializing in applied physics. Brain-wracking was just his way of beating monotony. Ethical quizzes, as soon as they began to appear, offered him something novel. Not

that he ever took any of them seriously.

"It's an understood thing, with intelligent people at least, that such tests are worthless. These were of the 'What would you do if . . . ' kind of thing. I kidded Frank about these latest ones. They were obvious questions, with obvious answers, I told him. And we had an argument. It ended with him handing me a paper—and a challenge. Put up or shut up. So I filled it out, sent it in—and forgot all about it." He put down his glass, and Delyra refilled it.

"Go on!" Thalog invited.

"Well, I had a slick letter from the secretary of what called itself 'The Ethical Association.' Would I care to try a really tough test. No prizes, and no obligation—just for interest. I couldn't see any harm in it, so I did. And it went on. There was one paper, I recall, where all the questions were loaded. Wide open, but loaded. 'Which is more important, the individual, or the society?' 'Should a person be free to take his own life?' That kind of thing. About twenty of them. I read right through, didn't mark one. There was a space for comment, at the bottom . . ."

"Where you wrote 'None of these questions can be answered as they stand, without additional data,'" Thalog interrupted, chuckling. "I saw a facsimile of that."

"But how do *you* come to be involved?"

"It is quite simple. When we of

the galaxy make contact with a new culture, one of the things we seek to know is its ethical standard. This is to put flesh on the bones of its history. We have many methods, developed over a long time. In this case, because you already have an established interest in tests and quizzes, we were able to use those—plus a few 'hidden' tests. As a linguist, I had studied your languages. Those based on Indo-European roots, at any rate. It was natural, therefore, that I would be the person best able to set the tests. I must add, without wishing to give offense, that your all-over ethical level is much higher than I would have expected, from a blind culture." This gave Spencer a twinge of guilt. He realized he couldn't go on with the deception very much longer.

"That final test, on Ganymede," he said. "That was really something. I didn't think, even then, that it was a Galactic matter, just that some of our advanced fanatics must have borrowed some of your specialized equipment. It was like a polygraph run, with extras. My trouble is, I haven't the same all-embracing trust in gadgetry that you seem to have. I've seen things go wrong, or be misread . . ." then he caught his breath. "Look," he said, "would you put me right with the princess? I've just remembered that I told her this was my first trip off Earth. And it isn't. I'd forgotten that trip to the testing station, on Ganymede!" Thalog laughed, a big, round, rolling laugh.

"That is quite all right," he soothed, between chuckles. "I will explain. But, you see, your concern for truth confirms the diagnosis. The machine made no mistake."

"As you say," Spencer shrugged, still not liking the idea that a machine would know him better than he knew himself, but admitting the possibility. "And, while you're at it, would you explain to her what a science-historian does? It comes out all wrong, in Galactalk."

"A trade language," Thalog made a face. "Everyone must speak it, but no one speaks it well. A crude instrument." He turned aside to speak to Delyra, and Spencer watched; in fascination, the flow and change of the tints of her garment. Given a little time, he thought, he could learn to "read" her by that alone. Then it occurred to him that he could achieve the same thing with a simple flick of his tongue, and he lost himself in a cloud of wondering why he could accept one, but not the other. A mellow gong boomed in the distance, and he roused himself to see Delyra hurrying away.

"The others are here," Thalog explained. "They, too, will be keen to meet you. Please make use of me for translation, it is my function. But, tell me, did you understand the principle of the test machine, on Ganymede?"

"I think so. My reactions were recorded . . . physical responses, chemical changes, brain rhythms

... we know about those. But the projections I was asked to watch—they were really something. I wish some of that material could be made available for Earth, for teaching purposes."

"But surely you have the techniques and the facilities for making such reconstructions of your own sociology and history?"

"Not like that." Spencer was suddenly enthusiastic. "They were strictly honest and factual. No prejudice, bias, or judgments passed, at all. Of course, it was easier for you, being alien, to be objective."

"Of course," Thalog said, dryly, and Spencer had to grin.

"Lord knows what you must think of us. But, you know, I was baffled by the whole thing. After the test—nothing! Until, months later, I had a card. Would I agree to being put on a waiting list, with the chance of taking part in a group-decision, sometime? No compulsion, no encouragement—just take it or leave it. Isn't that an odd way to go about it?"

"Is it? You made your choice, didn't you?"

"That's true. And here I am, for what difference it may make."

The far door swung open, and Delyra came hurrying in. Spencer got up, nervously. Thalog went past him a step or two, held out a hand to indicate.

"Than Simnel." He nodded to a small blue-gray man in a silver-white robe. "Fasla-en-Narsis." She might have stepped down from a

mountain village in Italy, were it not for her gorgeous silks. She managed to look old, grim, lively, and yet not unattractive. "And Rik Wiswood." He was as tall as Spencer, bald, grave and ordinary-looking, close-clad in black leather. "This is the Solarian, Gordon Spencer." In a brief aside, he added: "A nod suffices. We do not shake hands, here." They all found seats and settled, in easy quiet. Then Thalog stood up, looked round.

"Some of us have met before. All of us save Spencer have taken part in at least one major decision. But this is the first time we have met as a Five. As the 'question' was put to me, originally, with the request that I summon a Five—and as it was my summons which brought you here, I propose that I shall act as 'Leader' and have the casting vote. Agreed?" Spencer nodded with the rest.

"Very well. Now, before stating the question formally, are there any minor matters to settle?"

"A point." Simnel's sharp voice matched his smallness, chopping his Galactalk into jerky phrases. "Make clear—for Spencer—difference between formality and detail. Long, or short."

"Of course." Thalog turned aside, explained. "Some questions can be settled at once, on inspection. Then the thing is over, very quickly. But, if there is reasonable doubt, then further data, further discussion, is called for. The vote

should be 'withhold.' There follows a long and detailed session of investigation. You understand?" There was a tiny twinkle in his eye.

"Snap decisions are frowned on, eh?"

"Not really. You must speak as you find. All the same, it is not often that such as we can come together like this, and enjoy the exchange of ideas . . ." He let it hang there. Spencer hid a smile. Then he had a question of his own.

"Suppose," he said, "that one of us had refused the invitation, for any one of a number of reasons? Myself, for instance?"

"Another would have been asked, until a Five was achieved."

"So there was no special reason for asking me?"

"On the contrary. I would have been most disappointed had you not come. But it was just simple curiosity. I wanted to meet you."

Spencer digested that, silently. There were no more preliminary questions.

"Very well" Thalog nodded. "I will now put the formal 'question.' From the Supreme Overlord of the Sofam sector we are asked to decide whether or not a new culture, comprising a three-star system, seven inhabited planets and minor outposts, be admitted to that sector, and, if admitted, on what level?"

"Withhold!" Fasla-en-Narsis said, promptly. "What else, on *that* question?"

"How say the rest of you?"

Thalog looked round, met a chorus of agreement. "That will do, then I will instruct the expository delegation to attend us, tomorrow." He sat, and the formal atmosphere snapped like a thread. "Now, would any of you care to sample a typical Solarian potion? It has merit, I assure you. And, friend Spencer, we will introduce you to some of ours."

Somehow, and Spencer was never quite sure just how, he found himself fitting into the group like one finger of a hand. Curiosity was never offensive, confidences were swapped freely, opinions offered and analyzed, subtleties were understood despite the language barriers, and the amount of unprejudiced information he absorbed was even more heady than the various exotic tipples he tried, on their advice. It was late before the group finally broke apart. Walking carefully, he made his way to his room, and went to sleep in a warm glow that was not all liquor-inspired. It had been enlarging just to be free, forthright and candid, knowing that the other fellow was being the same, with no holds barred, no offense offered or taken.

And he had learned that the galaxy had its bad ones, too. Personal-power, like any other natural force, was available for the crooks the villains, the unethical as well as the ethical. Again, ethical standards had the defects of their virtues. You respected another man's privacy, for instance—and, if

he was ill-intentioned, you gave him an advantage. It sounded very familiar, to Spencer. But the big difference, he had found, was the attitude; and the judgment. It was justice, here, not law. You didn't measure a man by some "code." He was known for what he was, and judged accordingly. And the verdict was seldom "punishment," but "restitution." That was strange, at first, but he liked it. This was the way things ought to be, he thought.

Thanks to good health and a clean constitution, he was reasonably clearheaded when a chime woke him, in the morning. Sitting up in bed, he frowned at the stranger who stood in the doorway. A lean, keen-eyed man, medium-tall, wisp-bearded and businesslike in dark-blue velvet—yet familiar, somehow.

"Excuse me," he said, in careful Galactalk, "I am Gornal Taynee. I came after you, on the next ship, and arrived but a few moments ago. I trust you have been made more comfortable here than on your journey."

Spencer added it all together, swiftly, and felt embarrassed. "You must be Delyra's father—my host!" he made a futile gesture. "I am sorry I did not have the chance to thank you for your kindness . . ." Taynee cut him short with a shake of the head, came to the bedside.

"That was nothing," he said.

"My privilege. My concern is that you were attacked. I feel a responsibility. I have made inquiries and I think you should know, Great One, that the attack was indeed meant for you. This is hard to believe but my inquiries show no trace that I was the intended victim."

"I never thought otherwise," Spencer sat forward, hugging his knees. "But it wasn't for me to press it. Did you get any definite information . . . about the men . . . or the man behind it?"

"Almost nothing. The men were casuals, taken aboard at Hanlar. Beyond that, nothing at all!"

"Planet of origin?"

"They were Latvas—a minor race, in the Sofam sector, I think. Why, is that significant?"

"I wish I knew," Spencer scratched his chin. "Frankly, a Galactic sector is a pretty vague item, to me. And I can't imagine why somebody from that area should want me out of the way."

"It is a hard thing to believe," Taynee said, gravely. "But you will be quite safe here, at least. And welcome. It is a great honor."

Which was all very fine, Spencer mused, as he dressed and made his way back to the committee room, but if Latvas could ship in to Chaldun as casual ship-crew, there was no reason why a whole bunch of them might not already have come in the same way, and with the same lethal intent. He found Wiswood in the room already, and

helping himself to the contents of a tray. Settling in a seat, Spencer put the question bluntly.

"What would be a good reason for anyone wanting to kill me?"

"I could think of reasons," Wiswood frowned, giving the question impartial weighing, "but not good ones. I'd need more data."

"These were Latvas, acting under orders."

Wiswood dropped his abstract air, and stared. "You mean, this has actually happened to *you*? Forgive me, I thought you were speaking theoretically. But this is fantastic. You are sure?"

"You can ask the princess, she was there. And Garnol Taynee has just told me . . ." Spencer gave him the details, keeping back only his own personal secret. Wiswood listened, wide-eyed. Fasla-en-Narsis came in, frankly, yawning, her hair drawn into severe plaits, but the sleep left her face as she got the account. Spencer told the tale a third time, to Simnel, and watched all their faces, keenly, but there was nothing but blank surprise.

"It must have been error," Fasla-en-Narsis spoke for all of them. "No one would offer violence like this . . . to one of us. We are custodians"—she gave Spencer an odd, withdrawn look—"as is anyone who possesses a talent. It is not ours to buy or sell. It belongs to humanoid life. We are merely the carriers, the agents. When one of us dies, it is the galaxy's loss. To kill one of us is unthinkable!"

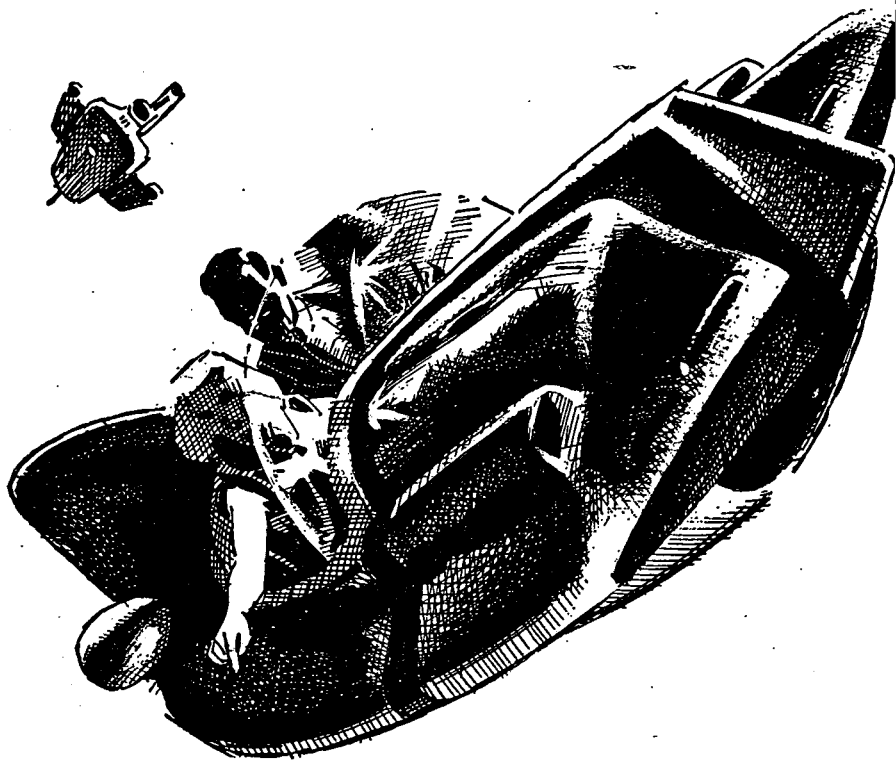
"But someone thought of it," Spencer insisted, "and, in the circumstances, the idea of accident is even more unlikely than the intention. There is one hypothesis that occurs to me, though. You say no one would think of offering violence to a Great One. But . . . how do you know that I am . . . one of you?"

"That is rubbish!" Thalogs boomed, from the door. "We *know*. If by nothing else, the very fact that you put such a question speaks for itself!"

"All right," Spencer agreed, but persisted along his line of thought. "You know . . . but it might not be as clear-cut for someone else. I recall a phrase the princess used—that everybody knows Solarians are defective."

"You insult yourself unnecessarily," Thalogs smiled. "The princess was guilty of an understandable exaggeration. Great sections of the galaxy have never even heard of Solarians. See here . . ." he reached for a metallic plate which hung on the wall. Spencer had seen it without understanding its purpose. Now he saw Thalogs pull out a slim stylus from the bottom edge, and use it to scrawl a large circle.

"The galaxy," he said, and drew radii from the center. "Crudely, these are sectors. This, here, is Ferl, where we are now. Next to it is Dorn. On the other side is Sofam. Then Gemeal . . ." and he had accounted for less than an eighth of



the disk. "Those are the family names of the elder races, the Overlords. I am of Dorn. So is Fasla. Simnel is of Gemeal. Wiswood is a Ferl, and is on home ground, as it were. But this is merely a convenience. We are a trader culture, and travel is our cheapest commodity. I could stun your mind with pumbers, but I will not. Frankly, they stun me, too. Yet, in all this great congress of peoples, no one would think of offering harm to a Great One. It must have been error that you were attacked."

Spencer realized that he was not going to get any further with his ideas, and sat back, letting the conversation run between them. He couldn't escape his own thought, though. He kept seeing a strong analogy between his adventure and the familiar "home" tactics of bringing bias to bear on a jury. It looked as if somebody badly wanted him out of the way, and it could be for no other reason than to swing the verdict on this coming "ques-

tion." If only he could find out who, and which way, he might offer to co-operate . . . He caught that thought back, ruefully. Being what he was, he would speak as he found, come what may, and no sort of pressure would change that.

"Your expression indicates a bad taste in the mouth, friend Spencer" Thalog broke in on his musings. "Do not let this thing worry you overmuch."

"I'm not . . . not the way you mean," Spencer smiled, wryly. "I'm just beginning to appreciate, all over again, that I am what I am, and I'm stuck with it. Tell me, suppose someone wanted to influence us, to put pressure on us, as a Five . . . ?" Thalog tightened his usually benevolent expression.

"You disappoint me, a little, my friend. I suppose it is natural for you to think in terms of your own culture, but you should try to realize that we do not think thus. We do not use force in that way."

Spencer was on the point of



pressing the "suppose" just once more, when Delyra appeared. She was keen to show him round the estate, and he decided to accept her offer. There was a sudden wooliness, a feeling of thrusting at shadows, between him and the others. He felt the need to get away from them, for a while.

This morning, she was wearing what was almost a sweater, in white fleece, and snug-fitting breeches so Earth-like that he had a pang of homesickness. She led him to an outbuilding and made him known to a pair of overwhelming animals, more like overgrown St. Bernard dogs than anything else he could think of.

"I should have guessed that was riding kit," he commented, studiously trying to conceal his nervousness for the massive beasts.

"You approve this kind of dress?" she asked, anxiously. "Harly Thalog told me that your women dress thus when riding."

"Considerate of you . . . but I wish I felt happier about the animals."

"The droy? But they are quite harmless . . . watch!" and she got aboard hers by the simple expedient of commanding it to crouch, and walking along a paw to its shoulder. Then she watched while he did likewise.

He felt like a character from an old print as they shambled away round the angle of the outbuilding and into a long lane. There was no

harness. You just caught hold of the knotty fur and hung on. They made for a low crest, about half a mile off, and by the time they had reached it he had learned something of the rhythm of movement of his mount. It was quite an experience. And quite an estate, too, as he could now see. She pointed out two orchards, a floral garden, a pool, and a large area, stretching back up the hill opposite, that was quite wild. Planned that way, he guessed. He also guessed, aloud, that it must take a small army of staff to run a place this size. But he was quite wrong. She explained.

One man, on his own, took care of all the "outside," so far as growing was concerned. Another took care of the livestock. Two women ran the huge house. One elderly woman supervised, and "mothered" Delyra in between times. And one more man, a major domo, was executive over all, responsible only to Garnol Taynee. Six people. He tried to explain to her that it would have taken possibly fifty, on Earth, to do the same job. Psionics made all the difference. And why not, he thought. But it made Garnol Taynee's assurances of safety seem thin and empty, suddenly. Then Delyra sat high on her mount, to point.

"There!" she cried. "It must be the delegation coming." He strained his eyes where she pointed, saw a distant blur on the white road, but could make nothing of it. But she was confident. "Yes, yes, they are

coming!" she repeated, and put her droy into a lumbering gallop.

Spencer grabbed, and hung on as his own mount followed. This was a different rhythm, and for a few fast minutes he was all over that broad back, until he chanced on the right spot, just behind the shoulder blades. Then it wasn't so bad. As for Delyra, she might have been sitting in a glue-patch for all the concern she showed. They went down the hill, swung round the house, and into the long lane which led to the entrance gate. He didn't know whether to be glad or sorry by the time they lumbered to a stop just inside the great gates. Taynee stood there. He raised a hand in greeting, but there was concern in his smile.

"You are comfortable?" he asked. "I fear Delyra did not ask whether you had ridden a droy before."

"That's all right," Spencer grinned. "I managed, but I reckon I've had enough, for the moment."

"Of course," Taynee made a faint gesture and the great beast crouched so that Spencer could scramble down. He gave the woolly side a hearty pat, and Taynee came round, close by.

"I will mount, now," he said. "As master of the house, it is fitting for me to greet my guests so. A formality, you understand?"

"I see" Spencer nodded. "You want me to retire? I can conceal myself in the bushes, if you like?"

"Not at all. You may do as you please. Formality is not for you."

So Spencer moved to stand by the furry leg of Delyra's mount, and she slid to the ground to stand by him. The cavalcade drew near. In the lead floated a magnificent car, silent, and full of glitter.

"The representatives of the Great Overlord of Sofam," Delyra explained in a whisper. "The Chief Minister"—a weathered and wrinkled old man, seemingly shrunken inside his ornate robes—"and the supervisors of the new culture"—four more, not quite so brilliantly garbed. All stiff and dignified—and green.

Spencer was so caught by their color, and the offputting cast of their features, that he could not be sure—it was just an impression—that sight of him had startled one or two of the "supervisors" out of their poise. It was just a fleeting impression, but he tucked it away for future reference.

There followed, impressively, twelve droy of a different breed, smooth-haired and fast-looking, two by two. And a great heavily-built yellow man on each. Spencer forgot his poise enough to stare, for these might have been brothers to the two assassins who had set about him, on the ship. He watched them jog by, and strove to comfort himself with thoughts of coincidence. At their heels came two long floats, boxed in and inscrutable. These, he guessed, would contain the exposition materials. Then there came another silent floating car, not nearly as magnificent as the first,

carrying six men. And this time, Spencer stared openly.

Bronzed, they were, and beak-nosed, with that combination of high-pitch alertness and complete ease which is the hallmark of one class of men, and one only. For looks, they could have doubled for typical Amerinds. Their dress was functional in a way that gave Spencer a pang of homesickness. Change the silver for drab, change a button or two, a fold here and there—and these men were a squad, were typical field-troops. A lieutenant and five, Spencer guessed, and would have staked his life on the rightness of the guess.

"Those will be the representative members of the culture," Delyra whispered, and Spencer nodded, thoughtfully. So much he had guessed, but something, very faintly, was beginning to smell all wrong to him. The tail of the cavalcade, yet another dozen hefty yellow men on droys, served only to make his inner uneasiness grow stronger. He had a query for Delyra.

"Those men?" she frowned. "They are just servants. Handlers. To help with the setting-up of the exposition. Why?"

"Would they be Latvas, d'you think?"

"You are associating them with the unfortunate business on the ship?" Taynee had overheard, and looked down, keenly. "They may be of that race but, I assure you, there can be no connection. Not here."

Spencer let it go, and, mounted behind Delyra, rode back to the house. At any other time he might have been embarrassed at snuggling so closely to her, but now his thoughts were such that he scarcely noticed she was there at all.

He knew, from experience, that there was such a thing as selective "blindness." When a man firmly believes that such-and-so a thing is not possible, he will refuse to see or hear it, no matter how obvious it may be. And he had no reason to doubt that the same was possible, even on a psionic level. The awkward part was that he had no way of finding out. In the very nature of the thing, it would be useless to ask a man, outright, if he was failing to "see" something.

The exposition was thorough, protracted, crammed with detail, and done with a high degree of expertise. The great hall had been commandeered for the purpose, and Spencer stuck close to Thalog, asking questions and studying the exhibits, alert for one or two themes. What he saw disturbed him—and what he did not see disturbed him even more.

The culture group in question, known as Kallone, dominated a three-sun system, each within a light-year of the other two, each with a planetary family. In all there were seven habitable planets and a scattering of outposts. The given figure for total population

was big enough to be meaningless, until Spencer thought of it as Earth-times-seven. It was a frightening thought. He eyed the exhibits, the artifacts, the pictorial records, and the underlying motif was plain to see. In the equivalent of five hundred years, the Kallone had spread from a continent to a planet, had jumped to another planet, then another. The same drive was obvious, all through. Do it better, faster, bigger, expand, grow, push . . . then burst and leap . . . attack, subjugate, dominate . . . and do it all over again.

"You've seen this kind of thing often?" he asked Thalag, and the burly man shrugged.

"Not quite like this. All cultures have common factors, of course, but each has its own differences, too. The rate of spread, here, is faster than anything I have heard of. Also, as you can see, they have achieved integration and interstellar combination before making the breakthrough in atomic structure and power. That is highly unusual. Of course, their star system encouraged that. Also, as you can see here, this nebular dust cloud shuts them off, largely, from knowledge of the rest of the galaxy. That is why they have remained out of contact for so long. Surely, friend Spencer, they must remind you very much of your own culture?"

"They do," Spencer said, as flatly as he could manage. "They are so like us that the missing items seem to stand out."

"Missing items?"

"Right. Look, for instance, at the great dependence on physical power for almost everything—up to a point. But . . . well, such a culture should be very highly sophisticated as to weapons, and I have seen none, apart from a few primitive models, more symbols than anything else."

"What could be more natural?" Thalag made a gesture. "We have no great interest in weapons, of any kind. A maturing culture tends to leave such things to the past."

Spencer had his own opinions on that. He asked another question on the same theme, distracting Thalag, who was fingering a book. "Tell me," he said, "does the galaxy, or the Galactic Federation as a whole, or any sector of it, mount and operate a striking force . . . an army . . . a fleet . . . warships?"

Thalag sighed, meaningly. "Of course not," he said. "These things are, shall we say, common at a certain stage of development. It is a primitive thought-pattern, to think that anything can be settled by the use of force. With maturity there comes a sense of unity, of shared relationships and purposes, of co-operation. I am a little disappointed at your preoccupation with ideas of force, Spencer. Almost, you make me wonder if, after all, the test-machines have made an error in your case." He said it very gently, obviously trying to avoid being harsh.

But Spencer set his jaw. "That's a

bit better," he said, grimly. "Now you're getting to know how I've been feeling all along. And now you can get an idea of how somebody else may be thinking, too!" Inwardly, he added "I'd like to know just who" and he shot a quick glance around, at the various faces watching.

The six Kallone stood in a bunch, in a clear space in the middle of the exhibits, deliberately aloof, giving nothing away. The Chief Minister had found a chair, at the far end of the hall and was deep in his own thoughts. Spencer glanced from him to the four who were responsible for the show, and shivered. All their eyes were on him, it seemed. He recalled that half-seen flicker of surprise, and tried to be objective about the sense of malevolence he felt. It was the unfortunate color of their faces, he told himself, and the strongly defined brow-ridges. They couldn't help the way they looked. Just the same, he hurried to join up with Thalog again. The burly man had his nose in another book, and was obviously managing to read it. Spencer caught his attention.

"If the verdict is favorable," he asked, "what then?"

"In detail, many things" Thalog nodded, thoughtfully. "In general, the Kallone culture will become the ward of the Sofam. The four you see . . . you would call them 'Protectors' . . . it will be their task to integrate the new culture and take charge of them, as quickly as is reasonably possible."

"How do you know it will be these four?"

"It is in the records," Thalog was patient. "These are the men who found and investigated the Kallone system. It is they who are making the request, who are putting the question."

"But I thought it was the Kallone people themselves who were doing that?"

"Of course . . . but through the Sofam representatives, who speak for them."

"Oh. Yes, I see . . ." A sudden light began to dawn in Spencer's mind, but he restrained it, cautiously, changed the line of questioning. "About the other thing, the personal powers?"

"We have a simple and efficient group-method for awakening the latent power, very quickly. The Kallone have the potential, in latent form."

"There's no doubt about that, then? That you will . . . I mean, their Overlords will . . . make them a present of full 'personal-power' capabilities? That is taken for granted?"

"But of course!" Thalog was having trouble, now, maintaining his calm patience. "Because these people have the latent power, it would be possible for us to dominate and manipulate them . . . to take an unfair advantage. That would violate every ethic we hold dear. It is our duty to bring them into full personal-power status, as quickly as possible."

"I see your point," Spencer nodded. He did, too. This was logic, and ethics, and selective blindness, all mingled in a web that he could see no way through. He had a sudden feeling of futility. "All right," he sighed. "Now . . . tell me how we cast our ballot." And watched as Thalog showed him the three signs—"For," "Against," and "Withhold."

He knew, now, how he was going to vote. This, he thought, could decide the fate of a culture. Never had he felt less competent, or more convinced. With the end of the exposition in sight, he saw one of the Protectors approach the Chief Minister and confer, in whispers, stiffly. Then the old man got up, made his way to where the Five were grouped. Spencer studied that old face, keenly, trying to guess what thoughts were hidden under the mask. Then Thalog went forward, and the two met at a distance from the group. There was more hushed whispering. Now Spencer could gather, from Thalog's back, that he was rejecting something, vigorously. He wondered what. The burly man came back, his face a study in careful control.

"The Chief Minister, Gal Horro, informs us that this concludes the presentation of material evidence . . . and will we decide now, or go on to examine further evidence?" He looked at them, interrogatively. "We could try a decision, now, if you wish? Simnel?" The little man made a gesture in favor. Wiswood

signed "Withhold." So did Faslaen-Narsis. Thalog's eye fell on Spencer, and he sagged, inwardly. Wishing himself anywhere but here, he made his sign "Against"—and caught, again, that flash of malevolence from one of the onlooking Protectors. Thalog nodded.

"Mine is the casting vote," he said, in a curious tone. "I will cast with Spencer . . . but this is not final. Come, I think we need a consultation." He led them away to the committee room. When they had settled, he put the question to Spencer, flatly. "You voted against. I'm sure you had good reasons. You will please explain them to me, and I will convey the sense of it to the others."

"Your vote was 'Against,' also," Spencer reminded him. "How about your reasons?" Thalog frowned, pursed his lips.

"Very well. That is just. I had many reasons. One, I wanted to keep the question open a little while longer, because I am interested in various odd aspects of the Kallone culture. Two, because I am bothered about you, friend Spencer, and wish to hear more of how you think, in this instance. Three, because, when Gal Horro approached me, just now, it was to say that an objection has been raised, against the validity of this Five!"

"Against me, you mean," Spencer put it, swiftly, while the others were gasping their protest. "Did the Chief Minister say just who had raised the ban?"

"I gathered that it came from the Kallone," Thalog said, with a frown. "Where else?"

"That's what you were meant to think. But if you really think, it's nonsense. Isn't it? I never heard of the Kallone before today—"

"Must be the Kallone!" Simnel put in, excitedly. "No Galactic would dream of questioning the validity of a Five. It is unthinkable!"

"All right, it's unthinkable," Spencer stood up, and looked at the four pairs of eyes which looked back at him, curiously. "You people talk much more than I had anticipated. The idea of being able to read a man's mind is a hard one to shake. But it isn't like that, at all. You talk. A lot. And that's my only hope. I have to try to convince you that admitting the Kallone to full Galactic status would be just about the most insane thing you could do. And I can give you only some of my reasons."

"Why not all?" Thalog asked, quietly.

"Because I'm not able to give evidence on some of them, only my feelings, and you can't feel them. I'd like to ask a question, though, just to clear one point in my own mind. Can personal-power be used as a striking weapon? I don't mean as persuasion, but as a literal force?"

"Always this preoccupation with force, with weapons!" Thalog shook his head. Spencer eyed him, then looked at the rest.

"Won't somebody answer?"

"It is just . . . possible" Faslaen-Narsis nodded. "Although my mind shrinks from the thought. But why do you want to know?"

"On the ship, coming here," Spencer said, evenly. "I was attacked, and the two men who made the attack were carrying knives. It has occurred to me that this was unnecessary. They could have strangled me, or killed me in any one of many other ways, without laying a finger on me."

"But that would not have worked with you!" Simnel put in, excitedly, "because you are . . ." and he stopped suddenly.

Spencer grinned, without humor, as he saw the change in their faces, now. "I'm defective, yes. I'll say it for you. So personal-power would not have affected me. Quite so. And those two men knew that, beforehand. That is why they were armed. They must have known who I was . . . yes?" He let a tense moment go by, then added, softly, "Who's going to be the first to say 'Unthinkable' . . . now? Or blame it on the Kallone?"

But . . ." Wiswood was obviously struggling with a new idea, "you are trying to tell us that someone, deliberately, wanted you removed, knowing who you were—simply in order to influence the decision of this Five!"

"That's right. That is what I have been saying, all along, but, to you, it was 'Unthinkable.'"

Thalog, you accuse me of being preoccupied with thoughts of force, and weapons. I will not argue. I will accuse you, all four of you, in your turn, of being stuck with the idea that certain things, even though they happen right before your eyes, are unthinkable. This is a blind attitude. If you persist in it, I can do nothing to convince you of my other points."

"You are asking us to set aside the values of centuries," Thalog rumbled. "It is not easy."

"It isn't exactly simple for me, either," Spencer snapped, and was immediately apologetic. "I'm sorry, but I'm the target, here, and it isn't easy. Look, let's leave my personal problems, for the moment. I want you to face something which is even more unthinkable than what you've already met. I want you to get out of your heads the idea that the Kallone are primitive, or inferior in any way. I want you to make an effort, and try to see them as the equals of any Galactic culture. Can you?"

"Why should we?" Fasla-en-Narsis asked, curiously. "In our terms they are a primitive culture. They lack the personal-power. . ."

"And that's *all* they lack!" Spencer interrupted, pointedly. "This is a race which has, in five hundred years, dominated first a planet, then a system, then two more nearby systems—some fifteen billion people—and all by the skilled and efficient use of force and physical power. You will admit

that, I think, Thalog? You saw enough to detect the pattern?"

"It is true enough, yes. But what are you trying to say?"

"A blind man learns to use his ears far more efficiently than a man who can see. He does not have better hearing. He just uses what he has, better. I can see and hear, reasonably well. So can most of my fellow men of Earth. But if it becomes necessary to follow a scent trail, we have to use an animal—just because we have neglected our sense of smell, in favor of other senses. In the same way, you have personal-power. You are born and grow up with it. You use it continuously. Consequently, you have neglected other things . . . the speed of thought and action that a 'deficient' race takes for granted. Where you automatically think in terms of reason and argument, and appeal to ethic the man of force thinks in terms of strongest and fastest. I am of such a culture, and know whereof I speak. We have sayings: 'May the best man win,' 'The first with the most,' 'The best form of defense is attack'—and many more. May I say, here, that these are not my personal beliefs—but they are common in my culture. The Kallone culture is almost the twin of my own, therefore the same, or similar, values will hold, there."

"But, don't you see, Spencer," Thalog was very patient, "this is exactly why they are inferior. Such is not the thinking of a truly mature culture."

"Thinking! I'm not talking about thinking, but action. These people, in action, are not in any way inferior to you. What they lack in one thing, they more than make up in others. A full-blown Galactic might be able to keep control over a Kallone, by personal-power . . ."

"But that would be unethical . . ." Wiswood put in, and then stopped.

"Unthinkable?" Spencer demanded, sharply. "Are you beginning to get it? Are you, at last, beginning to see that the one superiority you have over the Kallone is the one thing you insist on giving away to them?"

"We must give them equal status," Thalog insisted, puzzled. "What else can we do?"

Spencer sighed. This was even harder than he had imagined. "Scales!" he said, spreading his hands apart. "Equal balance . . . right? Now, take one item from this pan, put it in that . . . is it still equal?"

"What does that mean?" Fasla-en-Narsis snapped.

"Just that you are inferior, in many ways, to the Kallone. Your personal-power maintains the balance. Change that, and the balance is lost, in their favor, in favor of a culture which excels in force. I tell you, give the Kallone full status, give them personal-power, and they will explode. On Earth we have a saying about putting a lethal weapon in the hands of a child. You are

about to make a present of just such a weapon to a culture which has as its ethic the expert and ruthless use of force."

"I object," Simnel said, suddenly, "to the suggestion that I am slow, feeble and physically inferior. I am not large, as you see, but I claim to be as physically fit as any person my size!"

Spencer put out his hand to take up a small bronze bowl. It fitted comfortably into his palm. He had had his eye on it for some time. Now, with no warning, he tossed it across the long table to Simnel. The bowl glinted, slowed in its flight, and slid down to be gripped in the little man's palm. Simnel grinned, shook it.

"You see? I was quick!"

"Toss it back," Spencer asked, quietly. Catching the thing, he gave the little man a square stare. "Let's try that again, *without* personal-power?"

Simnel's eyes widened. Then, shrugging, he said, "Very well. I will try."

Some seconds later, the bowl clattered to the floor. He missed it several more times. So did all the rest. Spencer was pleased, in an oblique way, to see that they were becoming irritable. He put the bowl aside, reached for the drawing plate on the wall, eyed Simnel once more. Then he drew, quickly two horizontal lines, crossed them with two verticals, and beckoned the little man.

"This is the diagram," he said, "of a very simple problem game that we know, on Earth, as tick-tactoe, noughts and crosses, and other names. It is the most simple form of battle strategy I can think of." He went on to explain the rules.

Simnel lost the first five games in a row, in growing irritation. Then he caught on to the technique, and forced a stalemate. Then two more, and Spencer called a halt. "That will do," he decided. "Just remember the figures. Now, let's go and talk to the Kallone." He led the way out of the committee room, and Thalog fell in beside him. The burly man was his calm self again.

"There are other things on your mind," he said, quietly. "Your argument is a good one, but thin. Something else bothers you, I think?"

"That's good guessing," Spencer admitted. "There are quite a few other things on my mind, but I can't talk about them, not without getting into deep water. I'll say this, though. I'm not against the Kallone. I just don't want to see them smashed up. I have a pretty shrewd idea what it would do to my own people if they were to be given personal-power, just like that. Translation from the ethic of force to the ethic of reason is not something to be done in one breath. The wiser men of my own culture have debated this for many years, and without any simple answers forthcoming."

"Your people have debated personal-power?" Thalog asked, wonderingly. "But . . . there was nothing of this, in your literature. How—?"

"Don't ask," Spencer hushed him. "That's one of the things I have no business talking about. Point is, right now . . . can you speak Kallone?"

"I'm a linguist, not a magician," Thalog protested. "I can follow their script fairly well . . . but one of the Sofam will act as interpreter for us, I imagine."

They had reached the main hall, but none of the Sofam were in sight, apart from the old Chief Minister. Nor were any of the yellow men visible. The six Kallone stood, alertly at ease, in the midst of the exhibits, impassive but watching the Five. Thalog called the Chief Minister with a gesture, and the old man came close, his uniform glittering oddly against his withered form. Spencer took time to study him, deciding that it was, indeed, his unfortunate color that gave the impression of dislike. The man himself appeared sensible enough. But regretful. Thalog shook his head.

"Gal Horro explains that he has had no contact with the Kallone. This was all done by the four Protectors. I will call them."

"No!" Spencer stopped him. "It's just as well they're not here. You can manage with this . . ." and he held out the drawing plate. Thalog shrugged.

"If you insist. I wish I knew

what was in your mind, Spencer."

"I hope you will, soon enough," Spencer said, eyed the Kallone, and made a gesture to indicate that he wanted them to spread out in a semicircle round him. They did so, with every indication that they carried some sort of resentment for him. That was another little datum that he tucked away for a future consideration. For now, once they were to his liking, he said, over his shoulder to the rest of the Five, "Please watch, and note." He tossed the little bowl, without warning, to the man directly in front of him. The Kallone picked it out of the air without visible effort, and, at Spencer's invitation, tossed it back. As it met his palm, Spencer twisted his wrist, sent it spinning to the man at his left. As it was returned, he threw it again. And again.

"I hope that made you think," he said, turning to the rest of them, after the little demonstration had included each of the six men. "Please note their expressions. They are amused, and a little contemptuous, don't you think? Now, bring the plate, and let's try this man." He advanced, with Thallog, to the man on the right. It took a moment or two to communicate the basic elements of the game. It took the Kallone just one defeat to learn the strategy, such as it was. The next five games were stalemate. The look of contempt had become quite pronounced, now.

"You've made your point," Wis-

wood said, frankly, "but I don't see that it is very important. They are fit. Their reflexes, physical and mental, are better than ours. But what has that to do with personal-power?"

"Just this. These people have an ethic, and a very strong one, already. They have their own ideas on honesty and fair play, within the framework of what they know. They fight fair. At least, I am assuming so. Please note the phrase 'fight fair.' Assuming, again, a parallel between this culture and my own, to affect a man's mind is *not* fair—in their terms. It is something quite new, and will automatically be regarded as a new weapon."

"The idea of fighting fair," Faslaen-Narsis interrupted, "is quite without meaning to us, however familiar it may be to you. Could you meet one of these men, in a fight?" Spencer sighed. He had half-foreseen this.

"I suspect," he said, "that any one of these men could make a fool of me in a fight. They are all professionals."

"Yet you overcame two assassins, did you not?"

"That was a different matter altogether. Still, it is a reasonable point, and I am prepared to make a spectacle of myself, if it will help."

He cast his eye over the six Kallone, and picked out, by guess, the leader, that one he had classed as "lieutenant" in his own mind. Calling Thallog to help, he ap-

proached the man. "Explain to him," he said, "as carefully as you can, that I would like to engage him in a friendly trial of skill. Please be sure to stress 'friendly.' This floor is hard, and I have no wish to have my skull split."

He let the burly man busy himself with the drawing plate and gestures, while he stripped off his suitcoat and shirt. He was not looking forward to this, at all, nor was he in any way hopeful that the tussle would convince anybody. The idea of force as a way of life was too much for these Galactics to grasp, all at once.

Within minutes, the Kallone leader had grasped the idea, and peeled off his tunic. Studying the flat-muscled hardness opposing him, Spencer calculated that he had a slight advantage in height, reach, and weight. And he had been attentive in Judo classes. He was going to need all that.

Spencer managed a friendly grin, struck out a feint, and the Kallone brushed it aside, armed him off, jabbed a return, and swayed as his thrust was parried. They circled, cautiously. Spencer tried again, got an armlock and was jolted out of it by a hard elbow to the ribs. He went back, came in again, and met the Kallone face to face, in a bear-hug. Then, despite his straining, he was swept off his feet and put down, none too gently, on his back. The Kallone sneered, fell back, let

him get up. Then he darted in again, and was thrown, clean and solid, over Spencer's knee. It was Spencer's turn to stand back and let him get up.

Looking puzzled, and wary, the Kallone came back in. There was a quick flurry of arms, and the knee-throw didn't work at all, this time. Instead, it was Spencer who went down, on his face, in a shoulder-cracking armlock. Once more, the Kallone let go and danced back, but he was grinning, now.

Spencer grinned, too, ruefully, and worked his arm. "Play you one more," he said, and was certain that his meaning was taken, even if the words weren't. They came together solidly, grunting and twisting, feeling for holds. Then the Kallone went over and down, flat on his back, to a hip-throw. Spencer stood back, working hard for breath, to let him get up. Then he stuck out a hand, shook his head.

In Galactalk, he said, "Enough. You are too good for me. Too quick."

To his surprise, the Kallone nodded, grinning, and said, in the same tongue, "That was well done. A fair fight. You, too, are a warrior?"

"Not me," Spencer shook his head. "I am just an ordinary person I wish it had been known that you understand this talk. Much trouble might have been saved, and many questions could have been

answered. It is said, for instance, that your people . . . here . . . object to my presence, in this decision."

The Kallone's friendly grin slipped, suddenly, and he stepped back to join his comrades. "You are Solarian?" he demanded. Spencer surprised, nodded. "We have been told," the grim-faced soldier went on, "that Solarians are strange people, that they reject fellowship with the rest of the galaxy. We were told that you, as one of them, would be opposed to our application in this 'decision.' And we saw you make the sign of rejection." There was a hard note of accusation in his voice. Spencer struggled to conceal his bafflement. There was something here that didn't add up. He felt the rest of the Five come near, around him. He caught a glimpse of Gal Horro's splendor, but the old man's face showed that he, too, was puzzled.

"Then," Spencer said, carefully, "it was you who asked that I be put out of this decision group. You objected to my presence?" He saw the nods, and shrugged. There was a slight hiss of indignant breath around him and he put up his hand, quickly. "No, let me handle this," he said, quietly. To the stiff-faced warriors he said, "You may choose whether you believe or not, but I had already told these others that I did not consider myself a proper person to take part in this great question. It is true, also, that I am opposed to their decision. I am

quite ready, now or at any time, to withdraw."

"Spencer!" Thalog boomed, "you must not say this."

"I've just said it. And I will stand by it. But I would like to ask some questions of these men. You"—he indicated the man he had fought—"I do not know your name."

"I am Dana Krell. I lead this group."

"I had guessed as much. I am Gordon Spencer. Tell me, who has told you these things about me, and Solarians? Where did you learn this?"

"The Ambassadors of the Sofam told us, when we were coming here." The look on Gal Horro's face was enough to show that this was news to him. And Spencer seized at the word "Ambassador," as a clue to something that had irked him for a long while.

"The Sofam Overlords told you this," he nodded. "Thus they must have known, long ago, that I was to be here, and to take part in this decision." That was for the benefit of the rest of the Five. He hoped they would draw the obvious conclusions. He went on to the thing that was really bothering him.

"It is true," he said, "that my people rejected association with the rest of the galaxy. We are, in the main, a proud people, counting our freedom of more value than the offer of a subordinate place within the Galactic Federation, under the control of an Overlord. This was,



perhaps, foolish of us. I am glad to see that you, although so like us in many ways, are prepared to surrender your self-determination and your warlike ways, in order to live under the rule of the Sofam." He watched the proud faces opposite him, and knew, before they spoke, that his wild guess had been accurate.

"Surrender!" Krell snapped.

"Who talks of surrender? We, the Kallone, talk not of surrender, or of subordinate positions. We are an honorable race. This application we make is to be accorded full equality within the Great Federation."

"This you were told, by the Overlords?" Spencer said, quickly, before Gal Horro could voice the indignation that was purpling his aged features.

"This we were told," Krell con-

firmed. "We were told that the galaxy is great, with many planets for the taking, great wealth and unlimited prospects; that we, with the Sofam, would share in this . . ." his voice faltered as he saw the expressions opposite him. "It is not like this?" he asked.

"It's not a bit like that," Spencer said, quietly. "The whole of the galaxy is united . . . many millions of planetary systems, beyond counting . . . all united, on a friendly basis, of trade, business, reason and understanding. It is not warlike. There are no conquests to make. There is no place, here, for a warlike people. That, partly, is why my people chose to remain apart. Do you understand? The values are different, here."

"A trading culture? Merchants?" Krell said it with contempt, but Spencer was patient. This was something he knew well enough.

"The Kallone are great warriors," he said. "They rule their system, and two other suns. What of the other races who were there?"

"We defeated them!" Krell said, simply.

"Of course. In any battle, one wins . . . and the other loses. Remember . . . one loses, always. If, for instance, I have more food than I can eat, and you have more clothes than you can wear . . . and we fight . . . one must lose. The winner will have more clothes than he can wear and more food than he can eat . . . and the other one

. . . loses. In trade, both gain, no one loses. It is as simple as that."

Krell looked his bewilderment. It was no easier for him to switch values than it had been for the Ethical Absolutes.

"I do not understand this talk," he said. "We have been deceived."

"That's the big point," Spencer cut in, quickly. "You have been fooled, deliberately and to some purpose. Somebody has been trying to make use of you. Somebody with dreams of conquest, I'd say."

"Spencer," it was Thalogs again. "I can follow what you are getting at, but what you are suggesting is monstrous."

"Yes. I know. It's unthinkable . . . again." His weary tone hit the burly man like a slap in the face, but before he could retort, a harsh voice crackled across the hall, from the great entrance.

"Solarian!"

Spencer swung round, and saw his last suspicions confirmed, right up to the hilt. There, three feet inside the doorway, stood one of the Sofam Protectors. In his hand was something so nearly like a pistol that it could not be anything else. The fat barrel was aimed directly between the stiff shoulder blades of Garnol Taynee, who stood, steady but pale, two paces in front of his captor. To the left of the door, stolid and silent, were three yellow men, each clumsily clutching long-barrelled weapons. Spencer took it all in, in one light-

ning glance. This was it . . . the naked face of violence. "Don't anybody do anything rash," he muttered, to those around him. "Those things are lethal, no matter who holds them."

Then Taynee was speaking, shakily. "I am to tell you, Great One Spencer, that you are to surrender yourself to these men, peacefully. If you attempt to resist, they will kill me. If they fail to return to their companions within a reasonable time, then my daughter will die, also. They have her captive."

For one blinding moment, Spencer fought the rage that flared inside him. Then he thrust emotion aside, became cold. He had wanted proof to show the others. Now he had it—and it was his responsibility, all the way.

Thalogs rumbled, in his ear, "You cannot submit to this, Spencer. It is obvious that they mean to kill you, unbelievable as it seems."

"I know it." He lifted his hands wide, to shoulder height, turned on the little group at his back. To the rest of the Five, and Horro, he said, softly. "Don't try anything, anything at all. This is right outside your experience. Let me handle it." Then, to Krell, and his alert colleagues, he added, "This is what force does to weak men. Is this how you fight . . . against helpless men, and girls?" And then, "Think what this will do to your honor, to the name of the Kallone, throughout the galaxy!"

"What can we do?" Krell de-

manded. "We have no weapons. We were ordered to leave them behind, on the ship."

"They were not left behind, as you can see. Be alert, perhaps you can get them back again."

"Solarian!" the harsh voice came again. "You have heard the Prince Taynee. Do you surrender?"

Spencer gave Krell a hard look, turned again, and went, steadily, down the length of the hall, still with his arms spread. He drew near to Taynee, saw the beads of sweat on the tense man's face. As if from the casual need to speak, he moved between Taynee and the Sofam, and turned. Gently, and in a quite level voice, he said:

"When I say 'Now,' fall flat on your face, fast, and stay there. All right? *Now!*" and without waiting to see if he had been obeyed, he swung the edge of his hand in a slashing blow across the Sofam's face, catching him on the bridge of the nose. In the same movement, and with the swing of his body, he launched a kick to the crotch, and snatched the weapon as it fell. Still in the same swoop, he went forward, put his foot on the Sofam's neck, spun round, leveled the weapon at the three yellow men.

"Drop those things!" he snapped, waving the pistol meaningly, hoping they would not notice his fingers feeling the unfamiliar grip. His thumb felt a stud where a pistol would have had a hammer, and he pressed it. The kick, and the blam of the explosion came together—

and there were only two yellow men, now. The third was a shattered mess that made Spencer fight to control his heaves. Contact-explosive bullets, he thought, and winced as the long-barrels clattered to the floor. Then the Kallone came up, on the run, to seize the weapons and stand ready. Spencer held out the pistol, shakily, to Krell.

"You'd better have this," he muttered. "More in your line."

"What now?" Krell demanded. "There is still the girl."

Thalog came up, heavily, followed by the rest. "You must not risk yourself any further, Spencer," he panted. "They are counting on the affection between yourself and Delyra. You will be trapped."

"I know that, too!" Spencer snapped. "What I need, most, is information. And this man has it. He'll have to talk. No . . . not your way." He waved Thalog back. "I don't want him thinking himself to death. Let me do it. I'll make him talk fast enough." He went down on his knees by the writhing Sofam, took a rough grip on one arm, twisted it up behind his shoulders so that the green man went flat on his face, groaning. Applying leverage, he took hold of the little finger, and bent it, hard. The green man screamed. Spencer didn't like what he was doing, but he liked the thought of Delyra in the clutches of power-crazy Sofam even less. He put on the pressure. And the Sofam talked.

"All right." Spencer stood up,

when it was obvious that he had all there was to be known. "Can you take charge of this lot?" he indicated the sweating Overlord and the two stupefied yellow men.

"That we can do," Thalog said, grimly. "But why do you ask? What are you going to do?"

"I think you know. I'm going after Delyra, now that I know where she is. I'll need a droy—" he turned to Taynee, who nodded, reluctantly.

"If you wish," he said. "I know what you feel . . . but, you will be in danger, possibly killed. These men are insanel!"

"Drunk with power," Spencer said, grimly. "It's strong stuff for those who aren't used to it. As for being killed, that's a chance I have to take."

"You have no right to take it," Thalog growled. "If you are what you are, then your life is worth more than hers, however unpleasant it may seem."

"I'll leave you to figure out the niceties of it," Spencer shrugged. "I haven't the time to argue, right now. This has to be done quickly." He turned to find Krell barring his way.

"What talk is this?" the Kallone snapped. "They will let you go, alone, to rescue the girl?"

"They don't want me to go at all," Spencer said, carefully. "They count me a Great One in wisdom, and this is more value to them than the life of one girl. This is how reason works, against force."

"But the girl will be killed!"

"Possibly. The Sofam Overlords may carry out their threat, in their great need to have the Kallone as their private warriors. This is what they need you for, to bring force against the peaceful peoples of the galaxy."

"Then the honorable name of the Kallone will stink, throughout the whole of the galaxy . . ."

"And you will never be admitted to the Federation, on any kind of status. Yes, I'm afraid that is so. It is a pity, because there is another way, a much better way. With honor. But it may be too late, now."

"You will not go alone!" Krell said, harshly. "You shall not risk your life in defense of our honor while we stand idly by. We will come with you."

Within minutes the little party were mounted and thundering away, round the corner of the building and into the lane which led back to the wilderness up the hill. In the lead, Krell and Spencer manufactured hasty strategy. In front of them they could count on fifteen yellow men and the other three of the renegade Sofam—the whole armed with three of the long-barrels and five short-arms. The Kallone had carried one of each, as habit. Spencer's party had only the one short-arm and the three long-barrels taken from the yellow men. All they had to gam-

ble on, and it wasn't much, was that this outbreak by the Sofam was a hasty move, undertaken in crazy desperation by amateurs at violence.

"If we can come at them quickly," Spencer explained, "before they have had time to realize how mad they have been, then we have a chance. In that state of mind, they will not harm the princess at all. They are assuming that their show of force will be enough to terrify the rest into rejecting me. And they would be counting, perhaps, on your support, having prepared you to dislike me, anyway."

"This is difficult thinking, for me," Krell admitted. "You say there are no warrior races in the Galactic Federation, at all—none?"

"Not one. There is no armed might of any kind. There is no need for it, when all are peaceful brothers. This is why, when the Sofam discovered your worlds, and saw force in action, for the first time, they were infected with the idea, like a disease. With your peoples to do their fighting for them, they would rule the whole galaxy, in time."

"But that is fool talk. It is one thing to conquer. It is another thing to hold that which has been taken. Besides, one does not war on helpless people. You have saved us from a great evil, Spencer."

"Not yet, I haven't," Spencer grinned, as they broke from the open path into thick scrub. "I think we had better take it easy,

now. Don't want to scare them into anything foolish. You know what to do—surround me as if I'm your prisoner, and ride right up to the senior Sofam."

The tangled scrub made heavy going for the droy, and even heavier for the riders, who were forced to hang on like grim death against hooking thorns and knotted branches. Spencer refused to let his mind dwell on anything ahead of the immediate future. Problems were swelling up, but they would have to wait. Right now, a lot was going to depend on speed and surprise. He made a last, urgent appeal to the squad to mind their thoughts, to think as if they were a victory party. This, he had found with relief, was not a new concept to them, at all.

"We know of some who can sense what another is thinking," Krell had explained. "It is a great gift, though rare. I have often thought what a useful art it would be, to a warrior, to know what his enemy is thinking."

Spencer wished, vainly, that Thalog, and the rest, could have been present to hear that simple opinion. Then, suddenly, the thick scrub gave way to a great circular clearing, and there they were, all of them.

He saw Delyra first, and not until that moment had he permitted himself to think how much her safety meant to him. She sat dejectedly on the grass in the focal point of a semicircle, with the three Sofam

standing behind her, and the stolid yellow men gathered round. Like so many zombies, Spencer thought, in one brief flash of anger. Then he had scrambled down from his droy, and went running across the grass to her, to slide into a kneel by her side.

"Princess!" he muttered. "Are you all right? Not hurt?"

"Gordon!" her garment which had been drab gray flared into green-blue, "You? But you should not have come. They mean to . . . to kill you!"

"That's something I have my own ideas about," he retorted. "Just so long as you're all right. Now, listen. When I yell out, you drop flat on your face, and stay still." From the corner of his eye he saw the glossy boots of one of the Sofam coming close, and bunched himself, ready. "Understand me, now?" She blinked, and then nodded. He gave her a quick grin, gathered his legs under him, and then, with a harsh shout, launched himself up and at the standing green man. One step, a swinging kick to the knee, a flailing hand to the wrist which held the pistol, a quick snatch with the other hand, and he had the weapon. Gripping it, he swept that hand up and back, smashing the Sofam across the face with the hard metal barrel.

Without pause, and only dimly aware that the quiet glade had suddenly erupted into cursing action, he leaped across the wilting form

of the first Sofam, straight at the second, who had not yet managed to draw his pistol from its carrier. Up and down went his right hand, the shock of metal on skull a joyous jar up his arm. The third Sofam, teeth bared, lifted his weapon, and Spencer lashed out, frantically, with his. The two met, clashingly, and he cringed, expecting to be annihilated in an explosion. But there was only the exquisite agony of a crushed fingertip, and the sight of the two pistols flying in opposite directions. Biting on the pain, he flung out his left hand in a punch, felt it go home, saw the Sofam totter away. A flicker of movement to his left made him spin, in time to hoist his arm to fend off a grim-faced yellow man with a knife. A knife! The incongruity of it touched the back of his consciousness even as the blade burned him, laying his arm open from wrist to elbow. His perspective seemed to shift, suddenly, so that the real Spencer became remote and impersonal, standing afar off watching this vicious and blood-stained self, seeing it swing and grasp and heave, sending the lumbering yellow man flying through the air, to thud into the grass and lie still.

Off to his right, somewhere, there was an ear-aching explosion, and a scream. To his left, as he turned his head unsteadily, he saw the third Sofam, one hand tucked under his armpit, groping in the grass with his other hand, trying

to retrieve one of the pistols. Spencer took an unsure step forward—it had grown dark, or foggy, or something—so he measured his aim very carefully, swung, and kicked the crouching officer full in the face. Staggering from the effort, he swung round again, and went down as a great yellow man met him, with a roundhouse swipe. His body saved him, even as his mind was in the act of saying "This is it!" By blind instinct, he clutched a shoulder, got his foot into the belly of the mass that fell on him, and thrust upwards. For a moment, he lay still, debating whether or not he should get up again. It hardly seemed worth it, and the little voice that kept screaming at him to get up didn't make sense, at all.

Then, amazingly, he realized that the glade was quiet. He struggled to his feet, looked round, blearily, pumping for breath. Krell's face showed up, split by a broad grin, and enhanced by an angry red bruise across a cheekbone.

"All over, finished!" he cried. "They were fools, indeed, to pile the long-barrels at a distance like that. Come, we will take them back to the house. And we must see to your hurt."

"I'm all right," Spencer tried a grin, and could feel it coming out silly with his exhaustion. But his head was clear enough, and things had slipped into focus, again. "The princess," he said, "is she still all right?"

His answer came from Delyra herself, as she rushed forward to take his arm. The relief of seeing that she was unhurt, not even frightened, but more concerned for him than anything else, was like the letting go of whatever had been holding him up. The surroundings became badly blurred for him, after that. He heard voices that were weak and distant, knew that someone was binding his arm—had a silly moment of wondering just how she was going to rip off a piece of her skirt, when she wasn't wearing one—and then there was just haze. And then a slow, rhythmic, jogging motion. He came to, realizing that he was astride a droy, that the unconscious bulk of a Sofam lay across the beast's broad shoulders in front of him, and that gentle arms clutched him round the waist.

Riding by him, knee to knee, he saw Krell, also with a Sofam captive. A touch to those arms told him that it was Delyra, riding behind him, holding him up. He took a deep breath, touched those arms again, and saw that his own right arm was bound in uniform cloth, Sofam uniform.

"Too old for this game," he mumbled, to Krell. "Should have left it to professionals, like you."

"Not so!" Krell denied, grinning. "You did well. And they were fools, anyway. We have a saying, 'It takes a man to bend a bow, but any fool can loose the arrow!' We have much to thank you for, Spencer."

"Eh?" Spencer shook his head, dimly. "This is a change I do not understand."

Krell laughed, harshly. "We have them all, alive, as you advised, except one. That was unfortunate, but it could not be helped. Now we are going back to the Great Ones, and they will know that this folly was not of the Kallone. You will speak for us, I think, Spencer. Yes?"

"What do you want me to say?"

"Just that we of the Kallone do not murder, or fight against unarmed people. We understand this trading that you spoke of, but it is our way to trade from strength, with those we respect and with power to back our agreements. This is our way, and we will not give it up."

"Suppose," Spencer said, and his ideas were dreamily clear, now, "there was a way in which you could be certain of the binding honor of a trading agreement, without force . . . if it was possible for you to know, at all times, how the other man was thinking . . . what then?"

Krell frowned, in hard thought. "It is a difficult thing to think," he admitted. "This is how the rest of the Galactic peoples are?"

"That's right."

"I think, if my people could be like this, then there would be no more need for force, truly. But it would take a long time. When a man has grown up with power in his arm it does not fade easily from

his thinking. It will take a long time."

"You don't need me to speak for you," Spencer said, quietly. "You can say all that is necessary, yourself. You have said, just now, what I will say to the Great Ones myself, about my own people, who are very like yours. It will take us a long time, also."

And then the moment of lucidity passed and he felt the environment slipping away, so that he was thankful for the slim arms that held him safe. He had vague memories of stopping, of a distant voice saying, "He has lost much blood . . . needs rest." Then there was a very comfortable, warm, blackness, and a thankful letting-go.

The gentle ebb-and-flow of voices had been going on for some time. He had been hearing them, in growing irritation, wishing they would speak louder. He couldn't make out what they were saying. Then a phrase came clear.

" . . . Can't see, now, how you can argue that the test-devices are not capable of error. Surely this proves it?" and that was Rik Wiswood's voice.

"Suspensions are not evidence," Thalogs' voice was grimly dogmatic. "You know as well as I do that the devices are used only in the final stages, to give precise readings."

"Then how else do you explain it?" That was Simnel.

"There are three possible reasons. First, the Solarians have a long experience of testing methods and devices, and are, presumably, familiar with them. Second, there may be some inherent difference in the Solarian physical structure, which would falsify the readings . . ."

"But isn't that what we were just saying?"

"Not at all. The devices are not wrong, if used properly. But they can not give right answers from wrong data. This is just a guess, of course."

"A strong possibility, I would say," Fasla-en-Narsis spoke decisively. "There must be *some* difference in them. They are defective, remember?"

"The third possibility," Thalogs said, strongly, "is one we must always keep in mind. That we may be mistaken."

Spencer thought it was time he came alive. He pushed his eyes open, cautiously, and found himself in his bed, in the Taynee mansion, with the rest of the Five sitting round him. All their eyes were on him, at once.

"Ah!" Thalogs said, gently. "You are with us again. May I set your mind at rest on the main points, first?" Spencer nodded, guessing what he meant. "Very well. The princess is safe and well. The renegade Sofam are in safe custody. Their servants likewise. The Kal-lone await news of your well-being. have withdrawn their application

to be accepted into the Federation, and are ready to depart for their home system as soon as they know you are well. Is this enough?"

"It will do," Spencer said, quietly. "I gather there is a matter of much greater importance on your minds, right now. I imagine I'm on trial!"

"In a sense, yes. But what is really on trial is our whole system of selection. It appears to have broken down, in your case."

"In fact, you consider I have been guilty of unethical behavior."

"That is what it looks like." Thalag was obviously uncomfortable. "We can judge only as we see, in your case. We await your explanation, anxiously."

"All right!" Spencer sat up. "Just let's get one thing straight, before you tell me what I did wrong. It's this. I don't care, one way or the other, about my so-called standing as an Ethical Absolute. I just did what I knew to be the best thing, in the circumstances. If I have to explain, or to defend that, all right."

"Of course. What else could you do?" Thalag shot a "What-do-you-think-of-that?" look at the rest. Then, settling himself, he said, "You will understand, I am sure, that there is no such thing as an 'absolute,' in ethics. We dislike the term commonly used to describe such as we are, but it is too well accepted, now, to be changed. There are no ethical absolutes. But there are certain basic essentials,

such as the true value of a person as against that of a principle. The ethical person is he who can maintain the delicate but crucial balance between self-interest, and self-sacrifice, between individual and group values, between short-term and long-term effects. Balance is the essence; extremes are wrong. I am being vague, here, deliberately"—he cast another glance at his colleagues—"because I have the feeling we are making a mistake. Again!" He paused to think, shutting his eyes. Then,

"This 'decision,' for example, would not have been important. It was a major thing, but not difficult. Ordinarily, it would have gone through without question. But you have shown us, beyond doubt, that it would have been an error to admit the Kallone. More, you have been able to persuade them to withdraw their application. This is a good result. You are proven right. This makes us cautious. But . . . we saw you risk your personal safety, your life, for the sake of an urge, and we cannot consider this the act of a balanced person. You will understand, we do not condemn this act. It was brave, noble, inspiring . . . but unbalanced. This is what we saw. We await your explanation."

"You're isolating one point out of the whole," Spencer said, steadily. "That gives a wrong impression, to begin with. Also there is the fact that I had to make guesses in the absence of solid data. I was,

in part, gambling on guesswork. Is that wrong, in itself?"

"Not at all. One must make the best use of what one has."

"All right. Now, somebody tried to put me out of the way. Somebody was thinking in terms of force, and weapons. The logical people to look at would be the Kallone. They were that kind of culture. But there was no link between them and myself, except that they wanted membership, and I was one of those who would decide. How could they know that I would be against them? It didn't add up. Then, when I saw that they had brought no weapons with them, that did not add up, either. From what I know of my own culture, it is second nature to carry weapons, just in case. Why, even our first interstellar ship, under John Field—a purely exploratory venture—carried weapons. The crew would not have felt comfortable without them. Please realize that for a culture without personal power, this is axiomatic. Weapons, just in case!"

"Ah!" Thalag nodded, suddenly. "Know this . . . that the leader of the misguided Sofam four, one Tar Marras, was on the ship which met your John Field."

"That's it!" Spencer snapped his fingers. "That's the missing piece. He saw weapons. He also saw weapons, when studying the Kallone. Being no fool, he would see other parallels, and he would know that I would see them, also. *That*

was the part that had me guessing. How the Sofam could know my reactions. Anyway, what with the Kallone weaponless . . . with all records of weapons cut out of the exhibition, it was obvious that someone was trying to give a false impression. Also, I could not see a culture like the Kallone seeking a subordinate role. My own culture would not consider it, either. Just these factors, alone, were enough to make me reject the Kallone application. But I had to know more, because it was quite possible that such an application would be made again, to a different Five, and would succeed." He looked at the faces watching him, saw only intent waiting. He wondered what they were thinking.

"I had to know, one way or the other, whether the pressure was being put on by the Kallone, or by somebody else. So, as you saw, I took the whole argument to the Kallone themselves. If they were trying to eliminate me, then that was their chance. But, although they did voice an objection, it was because of what they had been told. Which could mean, only, the Sofam. But, to you, that was 'unthinkable.' So I had to make it thinkable for you. It meant risking my life, which I did not like"—he kept his voice flat—"but it was for the sake of the Kallone culture . . . and for the rest of the galaxy, in the long view. But, I did not expect, nor foresee, that my host, or his daughter, would be put in danger, on my account. My purpose was

achieved, otherwise, and my life was already in jeopardy, so I cannot see that it was unethical to take it further, and attempt to rescue the princess."

"Would you have gone, alone?"

"I think so. That part of the business was mine, anyway. But I would have been disappointed in the Kallone, had they not been eager to help. It was in keeping with their character, as I saw it."

Thalog's face was a study. So were the others. It was Fasla-en-Narsis who at last broke the silence.

"We owe you much," she said, quietly. "We have made things very difficult for you, and you have managed to keep a balance despite everything. Our only excuses are two. One, that we were ignorant of such things as force, and, two, that there was a barrier between us—between ourselves and you."

That's another thing," Spencer sat forward, bracing himself. "I want to reopen this Kallone question, in another way. They must not be allowed to go back to their own system under the wrong impression—that there is no place for them in the galaxy. Because it is not true. This, again, is where your ignorance is upsetting your judgment. You class a culture as primitive just because it does not have personal-power. You"—he turned to Thalog—"expressed surprise at the high ethical standards of Solarians, who are 'defectives.' I have

talked with the Kallone. I advise that you do the same. You will find that they have a very high ethical standard, also. It is perfectly possible to develop such standards, on the basis of force. It is a mistake, in other words, to class a culture as primitive, just because it does not have this one thing."

"This we are beginning to realize," Thalog said. "We will have to change many of our values."

"Not so many," Spencer grinned. "You need to change one, though. You must not expect a proud, highly developed culture to accept the word 'primitive.' And you cannot expect such a culture to change its way of thinking, overnight. That is what I wanted to get at. The Kallone must not be rejected. Instead, why not let them find their own way to developing personal-power—with a bit of judicious help?"

"Spencer!" Thalog was suddenly suspicious. "You are concealing something from us. You talk too freely of what can be done with personal-power, as if you were familiar with it. How can you know all this?"

"That is another thing you'll have to change," Spencer said, keeping his voice as steady as possible over the butterflies in his belly. "Solarians are not defective, at all. I am not defective."

"How can this be?" Wiswood demanded. "I see you . . . yet, to my mind, you are not there, at all!"

"I have deceived you," he said.

"This was unethical, possibly, but the secret was not mine to release, until now, until it had to be done. John Field and all his crew, every Solarian you have ever met, myself included is shielded. Protected."

"What may that mean?" Thalog snorted.

"Just this!" Spencer whispered, and moved his tooth-switch to zero, flicking away his protection.

Now he was stripped naked in their sight. Now he would know, and they would know, beyond question, what manner of person he was.

Thalog turned away from him, deliberately, to Wiswood. "Now!" he boomed. "Now do you doubt the efficiency of the tests?"

"You mean . . . it's all right? It's true?" Spencer gaped.

"It is true. Did you ever doubt it? But you are as one who stands outside, waiting to enter. If you want to be with us, wholly, you have only to push, just a little."

And there was no need for him to speak. There was a pain that was not a pain, a twisting, struggling, breaking free, and he opened his eyes to a world that was different, in a way that he had never suspected it could be. It was a world in which everything was alive and had significance. By comparison, his old world had been a dull, gray place. He looked at Thalog, seeing him as a warm, strong flame, Fasla-en-Narsis as a keen blade, Simnel as a dancing spark of fire, Wiswood a clear glow—and all steady and

serene. He shut his eyes, and they were still there.

"Now tell us," Thalog beamed on him, "what manner of device is this, that can blot out a man?" Spencer explained what he could of the gadget, and the immense difference between this channeled function and the real thing he could now perceive.

"We have known of this for a long while," he said. "We call it psionics, and we know what a disaster such a thing could be, if it were released all at once, into a culture like ours. But, you see, we do have the ethical stature to know this, and control it. Some of us. And, by degrees, it will spread. The Kallone, as I know, are very like us in this. If the know-how for a device like this could be 'leaked' to them, carefully, then they could follow the same path, by themselves. You agree?" He could see that they did.

"That's it, then," he said. "The party is over. As soon as I'm fit, I suppose it's me for home."

Fasla-en-Narsis snorted, in a most unladylike way, and there was a wave of fellow-feeling, engulfing him like a firm handshake.

"Home?" she said. "You are home now. Here, or anywhere else in the galaxy. And you are forgetting someone else—" He followed her brief gesture, to see Delyra standing in the doorway. What he saw there, with his new senses, told him that he was, indeed, home. To stay. ■

...After a Few Words...

This is a science-fiction story.
History is a science; the other part is,
as all Americans know,
the most fictional field we have today.

by Seaton McKettrig

Illustrated by Summer



■ He settled himself comfortably in his seat, and carefully put the helmet on, pulling it down firmly until it was properly seated. For a moment, he could see nothing.

Then his hand moved up and, with a flick of the wrist, lifted the visor. Ahead of him, in serried array, with lances erect and pennons flying, was the forward part of the column. Far ahead, he knew, were the Knights Templars, who had taken the advance. Behind the

Templars rode the mailed knights of Brittany and Anjou. These were followed by King Guy of Jerusalem and the host of Poitou.

He himself, Sir Robert de Bouain, was riding with the Norman and English troops, just behind the men of Poitou. Sir Robert turned slightly in his saddle. To his right, he could see the brilliant red-and-gold banner of the lion-hearted Richard of England—*gules, in pale three lions passant guardant or*. Behind the



standard-bearer, his great war horse moving with a steady, measured pace, his coronet of gold on his steel helm gleaming in the glaring desert sun, the lions of England on his firm-held shield, was the King himself.

Further behind, the Knights Hospitallers protected the rear, guarding the column of the hosts of Christendom from harassment by the Bedouins.

"By our Lady!" came a voice from his left. "Three days out from Acre, and the accursed Saracens still elude us."

Sir Robert de Bouain twisted again in his saddle to look at the knight riding alongside him. Sir Gaeton de l'Arc-Tombé sat tall and straight in his saddle, his visor up, his blue eyes narrowed against the glare of the sun.

Sir Robert's lips formed a smile. "They are not far off, Sir Gaeton. They have been following us. As we march parallel to the seacoast, so they have been marching with us in those hills to the east."

"Like the jackals they are," said Sir Gaeton. "They assail us from the rear, and they set up traps in our path ahead. Our spies tell us that the Turks lie ahead of us in countless numbers. And yet, they fear to face us in open battle."

"Is it fear, or are they merely gathering their forces?"

"Both," said Sir Gaeton flatly. "They fear us, else they would not dally to amass so fearsome a force. If, as our informers tell us, there

are uncounted Turks to the fore, and if, as we are aware, our rear is being dogged by the Bedouin and the black horsemen of Egypt, it would seem that Saladin has at hand more than enough to overcome us, were they all truly Christian knights."

"Give them time. We must wait for their attack, sir knight. It were foolhardy to attempt to seek them in their own hills, and yet they must stop us. They will attack before we reach Jerusalem, fear not."

"We of Gascony fear no heathen Musselman," Sir Gaeton growled. "It's this Hellish heat that is driving me mad." He pointed toward the eastern hills. "The sun is yet low, and already the heat is unbearable."

Sir Robert heard his own laugh echo hollowly within his helmet. "Perhaps 'twere better to be mad when the assault comes. Madmen fight better than men of cooler blood." He knew that the others were baking inside their heavy armor, although he himself was not too uncomfortable.

Sir Gaeton looked at him with a smile that held both irony and respect. "In truth, sir knight, it is apparent that you fear neither men nor heat. Nor is your own blood too cool. True, I ride with your Normans and your English and your King Richard of the Lion's Heart, but I am a Gascon, and have sworn no fealty to him. But to side with the Duke of Burgundy against King Richard—" He gave a short,

barking laugh. "I fear no man," he went on, "but if I had to fear one, it would be Richard of England."

Sir Robert's voice came like a sword: steely, flat, cold, and sharp. "My lord the King spoke in haste. He has reason to be bitter against Philip of France, as do we all. Philip has deserted the field. He has returned to France in haste, leaving the rest of us to fight the Saracen for the Holy Land, leaving only the contingent of his vassal the Duke of Burgundy to remain with us."

"Richard of England has never been on the best of terms with Philip Augustus," said Sir Gaeton.

"No, and with good cause. But he allowed his anger against Philip to color his judgment when he spoke harshly against the Duke of Burgundy. The Duke is no coward, and Richard Plantagenet well knows it. As I said, he spoke in haste."

"And you intervened," said Sir Gaeton.

"It was my duty." Sir Robert's voice was stubborn. "Could we have permitted a quarrel to develop between the two finest knights and warleaders in Christendom at this crucial point? The desertion of Philip of France has cost us dearly. Could we permit the desertion of Burgundy, too?"

"You did what must be done in honor," the Gascon conceded, "but you have not gained the love of Richard by doing so."

Sir Robert felt his jaw set firmly. "My king knows I am loyal."

Sir Gaeton said nothing more, but there was a look in his eyes that showed that he felt that Richard of England might even doubt the loyalty of Sir Robert de Bouain.

Sir Robert rode on in silence, feeling the movement of the horse beneath him.

There was a sudden sound to the rear. Like a wash of the tide from the sea came the sound of Saracen war cries and the clash of steel on steel mingled with the sounds of horses in agony and anger.

Sir Robert turned his horse to look

The Negro troops of Saladin's Egyptian contingent were thundering down upon the rear! They clashed with the Hospitallers, slamming in like a rain of heavy stones, too close in for the use of bows. There was only the sword against armor, like the sound of a thousand hammers against a thousand anvils.

"Stand fast! Stand fast! Hold them off!" It was the voice of King Richard, sounding like a clarion over the din of battle.

Sir Robert felt his horse move, as though it were urging him on toward the battle, but his hand held to the reins, keeping the great charger in check. The King had said "Stand fast!" and this was no time to disobey the orders of Richard.

The Saracen troops were coming in from the rear, and the Hospitallers were taking the brunt of

the charge. They fought like madmen, but they were slowly being forced back.

The Master of the Hospitallers rode to the rear, to the King's standard, which hardly moved in the still desert air, now that the column had stopped moving.

The voice of the Duke of Burgundy came to Sir Robert's ears.

"Stand fast. The King bids you all to stand fast," said the duke, his voice fading as he rode on up the column toward the knights of Poitou and the Knights Templars.

The Master of the Hospitallers was speaking in a low, urgent voice to the King: "My lord, we are pressed on by the enemy and in danger of eternal infamy. We are losing our horses, one after the other!"

"Good Master," said Richard, "it is you who must sustain their attack. No one can be everywhere at once."

The Master of the Hospitallers nodded curtly and charged back into the fray.

The King turned to Sir Baldwin de Carreo, who sat a horse nearby, and pointed toward the eastern hills. "They will come from there, hitting us in the flank; we cannot afford to amass a rearward charge. To do so would be to fall directly into the hands of the Saracen."

A voice very close to Sir Robert said: "Richard is right. If we go to the aid of the Hospitallers, we will expose the column to a flank attack." It was Sir Gaeton.

"My lord the King," Sir Robert heard his voice say, "is right in all but one thing. If we allow the Egyptians to take us from the rear, there will be no need for Saladin and his Turks to come down on our flank. And the Hospitallers cannot hold for long at this rate. A charge at full gallop would break the Egyptian line and give the Hospitallers breathing time. Are you with me?"

"Against the orders of the King?"

"The King cannot see everything! There are times when a man must use his own judgment! You said you were afraid of no man. Are you with me?"

After a moment's hesitation, Sir Gaeton couched his lance. "I'm with you, sir knight! Live or die, I follow! Strike and strike hard!"

"Forward then!" Sir Robert heard himself shouting. "Forward for St. George and for England!"

"St. George and England!" the Gascon echoed.

Two great war horses began to move ponderously forward toward the battle lines, gaining momentum as they went. Moving in unison, the two knights, their horses now at a fast trot, lowered their lances, picking their Saracen targets with care. Larger and larger loomed the Egyptian cavalymen as the horses changed pace to a thundering gallop.

The Egyptians tried to dodge, as they saw, too late, the approach of the Christian knights.

Sir Robert felt the shock against himself and his horse as the steel tip of the long ash lance struck the Saracen horseman in the chest. Out of the corner of his eye, he saw that Sir Gaeton, too, had scored.

The Saracen, impaled on Sir Robert's lance, shot from the saddle as he died. His lighter armor had hardly impeded the incoming spear-point, and now his body dragged it down as he dropped toward the desert sand. Another Moslem cavalryman was charging in now, swinging his curved saber, taking advantage of Sir Robert's sagging lance.

There was nothing else to do but drop the lance and draw his heavy broadsword. His hand grasped it, and it came singing from its scabbard.

The Egyptian's curved sword clanged against Sir Robert's helm, setting his head ringing. In return, the knight's broadsword came about in a sweeping arc, and the Egyptian's horse rode on with the rider's headless body.

Behind him, Sir Robert heard further cries of "St. George and England!"

The Hospitallers, taking heart at the charge, were going in! Behind them came the Count of Champagne, the Earl of Leister, and the Bishop of Beauvais, who carried a great warhammer in order that he might not break Church Law by shedding blood.

Sir Robert's own sword rose and fell, cutting and hacking at the enemy. He himself felt a dreamlike

detachment, as though he were watching the battle rather than participating in it.

But he could see that the Moslems were falling back before the Christian onslaught.

And then, quite suddenly, there seemed to be no foe to swing at. Breathing heavily, Sir Robert sheathed his broadsword.

Beside him, Sir Gaeton did the same, saying: "It will be a few minutes before they can regroup, sir knight. We may have routed them completely."

"Aye. But King Richard will not approve of my breaking ranks and disobeying orders. I may win the battle and lose my head in the end."

"This is no time to worry about the future," said the Gascon. "Rest for a moment and relax, that you may be the stronger later. Here—have an *Old Kings*."

He had a pack of cigarettes in his gauntleted hand, which he proffered to Sir Robert. There were three cigarettes protruding from it, one slightly farther than the others. Sir Robert's hand reached out and took that one.

"Thanks. When the going gets rough, I really enjoy an *Old Kings*."

He put one end of the cigarette in his mouth and lit the other from the lighter in Sir Gaeton's hand.

"Yes, sir," said Sir Gaeton, after lighting his own cigarette, "*Old Kings* are the greatest. They give a man real, deep-down smoking pleasure."

"There's no doubt about it, *Old Kings* are a *man's* cigarette." Sir Robert could feel the soothing smoke in his lungs as he inhaled deeply. "That's great. When I want a cigarette, I don't want just *any* cigarette."

"Nor I," agreed the Gascon. "*Old Kings* is the only real cigarette when you're doing a real *man's* work."

"That's for sure." Sir Robert watched a smoke ring expand in the air.

There was a sudden clash of arms off to their left. Sir Robert dropped his cigarette to the ground. "The trouble is that doing a real *he-man's* work doesn't always allow you to enjoy the fine, rich tobaccos of *Old Kings* right down to the very end."

"No, but you can always light another later," said the Gascon knight.

King Richard, on seeing his army moving suddenly toward the harassed rear, had realized the danger and had charged through the Hospitallers to get into the thick of the fray. Now the Turks were charging down from the hills, hitting—not the flank as he had expected, but the rear! Saladin had expected him to hold fast!

Sir Robert and Sir Gaeton spurred their chargers toward the flapping banner of England.

The fierce warrior-king of England, his mighty sword in hand,

was cutting down Turks as though they were grain-stalks, but still the Saracen horde pressed on. More and more of the terrible Turks came boiling down out of the hills, their glittering scimitars swinging.

Sir Robert lost all track of time. There was nothing to do but keep his own great broadsword moving, swinging like some gigantic metronome as he hacked down the Moslem foes.

And then, suddenly, he found himself surrounded by the Saracens! He was isolated and alone, cut off from the rest of the Christian forces! He glanced quickly around as he slashed another Saracen from pate to breastbone. Where was Sir Gaeton? Where were the others? Where was the red-and-gold banner of Richard?

He caught a glimpse of the fluttering banner far to the rear and started to fall back.

And then he saw another knight nearby, a huge man who swung his sparkling blade with power and force. On his steel helm gleamed a golden coronet! Richard!

And the great king, in spite of his prowess was outnumbered heavily and would, within seconds, be cut down by the Saracen horde!

Without hesitation, Sir Robert plunged his horse toward the surrounded monarch, his great blade cutting a path before him.

He saw Richard go down, falling from the saddle of his charger, but by that time his own sword was cutting into the screaming Saracens,

and they had no time to attempt any further mischief to the King. They had their hands full with Sir Robert de Bouain.

He did not know how long he fought there, holding his charger motionless over the inert body of the fallen king, hewing down the screaming enemy, but presently he heard the familiar cry of "For St. George and for England" behind him. The Norman and English troops were charging in, bringing with them the banner of England!

And then Richard was on his feet, cleaving the air about him with his own broadsword. Its bright edge, besmeared with Saracen blood, was biting viciously into the foe.

The Turks began to fall back. Within seconds, the Christian knights were boiling around the embattled pair, forcing the Turks into retreat. And for the second time, Sir Robert found himself with no one to fight.

And then a voice was saying: "You have done well this day, sir knight. Richard Plantagenet will not forget."

Sir Robert turned in his saddle to face the smiling king.

"My lord king, be assured that I would never forget my loyalty to my sovereign and liege lord. My sword and my life are yours whenever you call."

King Richard's gauntleted hand grasped his own. "If it please God, I shall never ask your life. An earldom awaits you when we return to England, sir knight."

And then the king mounted his horse and was running full gallop after the retreating Saracens.

Robert took off his helmet.

He blinked for a second to adjust his eyes to the relative dimness of the studio. After the brightness of the desert that the televicaron helmet had projected into his eyes, the studio seemed strangely cavelike.

"How'd you like it, Bob?" asked one of the two producers of the show.

Robert Bowen nodded briskly and patted the televike helmet. "It was O.K.," he said. "Good show. A little talky at the beginning, and it needs a better fade-out, but the action scenes were fine. The sponsor ought to like it—for a while, at least."

"What do you mean, 'for a while'?"

Robert Bowen sighed. "If this thing goes on the air the way it is, he'll lose sales."

"Why? Commercial not good enough?"

"Too good! Man, I've smoked *Old Kings*, and, believe me, the real thing never tasted as good as that cigarette did in the commercial!" ■

Gadget vs. Trend

It's sometimes quite remarkable the way a man changes his opinions when he actually gets what he always said he wanted...

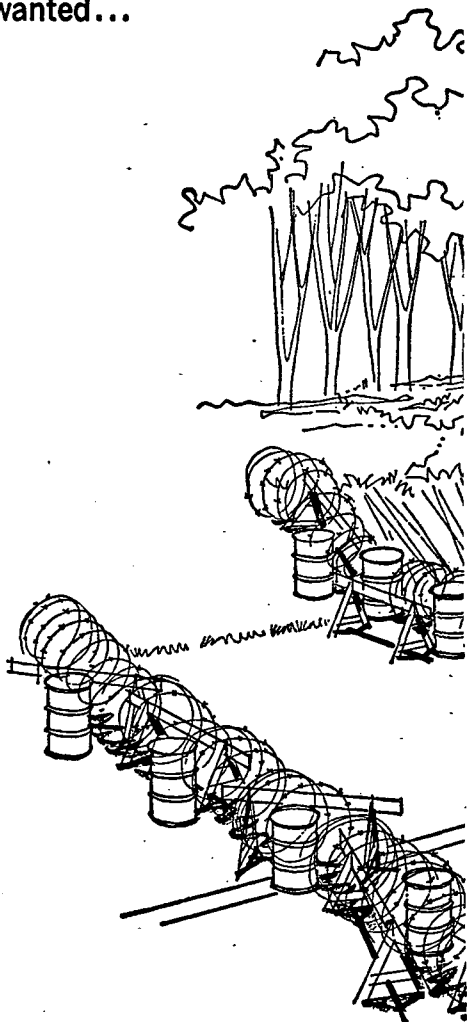
by Christopher Anvil

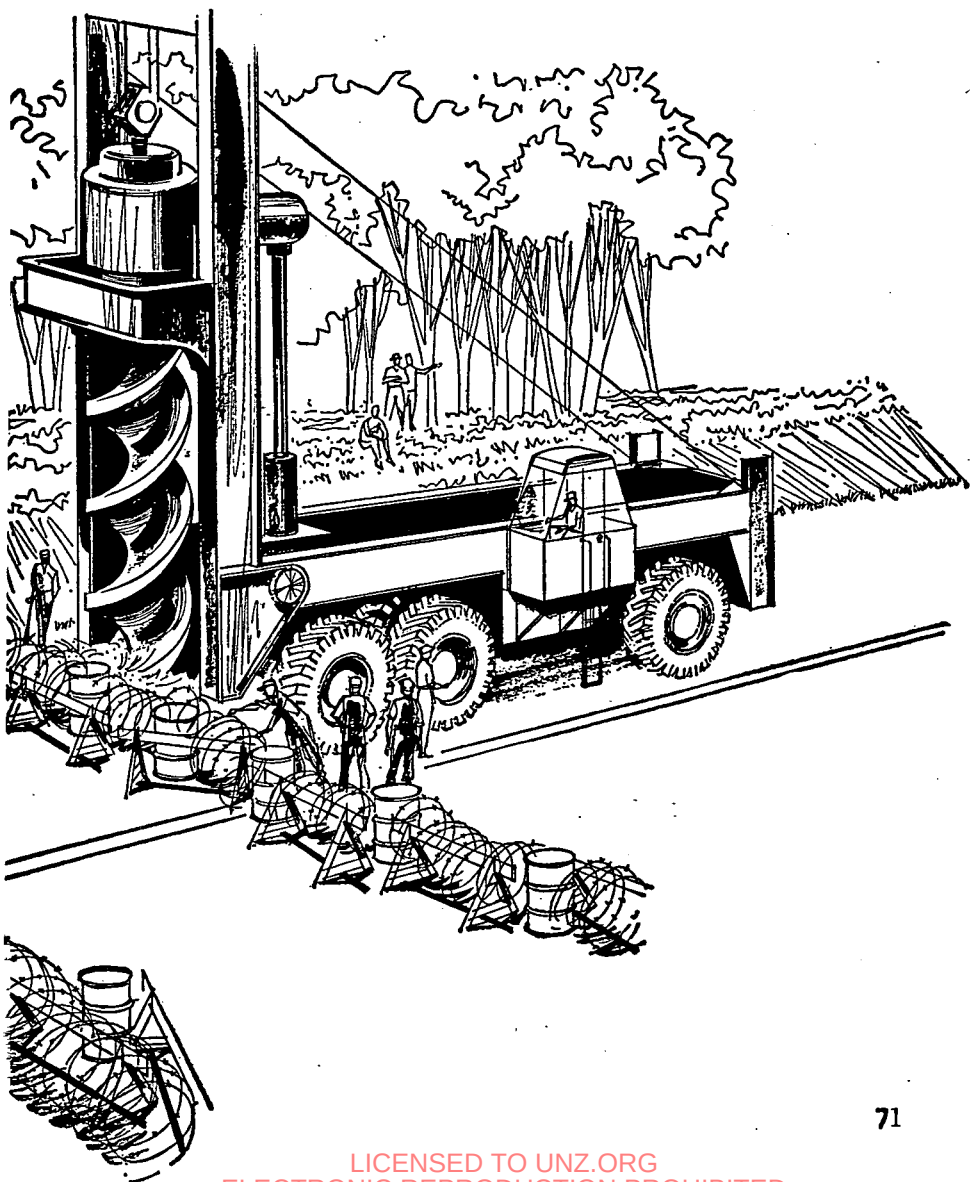
Illustrated by Brotman

■ Boston, Sept. 2, 1976. Dr. R. Milton Schummer, Professor of Sociology at Wellsford College, spoke out against "creeping conformism" to an audience of twelve hundred in Swarton Hall last night.

Professor Schummer charged that America, once the land of the free, is now "the abode of the stereotyped mass-man, shaped from infancy by the moron-molding influences of television, mass-circulation newspapers and magazines, and the pervasive influence of advertising manifest in all these media. The result is the mass-production American with interchangeable parts and built-in taped program."

What this country needs, said Dr. Schummer, is "freedom to differ, freedom to be eccentric." But, he concluded, "The momentum is too great. The trend, like the tide, cannot be reversed by human efforts. In two hundred years, this nation has gone from individualism to conformism, from independence to





interdependence, from federalism to fusionism, and the end is not yet. One shrinks at the thought of what the next one hundred years may bring."

Rutland, Vt., March 16, 1977. Dr. J. Paul Hughes, grandson of the late inventor, Everett Hughes, revealed today a device which his grandfather kept under wraps because of its "supposedly dangerous side-effects." Dubbed by Dr. Hughes a "privacy shield," the device works by the "exclusion of quasi-electrons." In the words of Dr. Hughes:

"My grandfather was an eccentric experimenter. Surprisingly often, though, his wild stabs would strike some form of pay dirt, in a commercial sense. In this present instance, we have a device unexplainable by any sound scientific theory, but which may be commercially quite useful. When properly set up, and connected to a suitable electrical outlet, the device effectively soundproofs material surfaces, such as walls, doors, floors, and the like, and thus may be quite helpful in present-day crowded living conditions."

Dr. Hughes explained that the device was supposed to operate by "the exclusion of 'quasi-electrons,' which my grandfather thought governed the transmission of sound through solid bodies, and performed various other esoteric functions. But we needn't take this too seriously."

New York, May 12, 1977. Formation of Hughes QuietWall Corporation was announced here today.

President of the new firm is J. Paul Hughes, grandson of the late inventor, Everett Hughes.

New York, Sept. 18, 1977. One of the hottest stocks on the market today is Hughes QuietWall. With demand booming, and the original president of the firm kicked upstairs to make room for the crack management expert, Myron L. Sams, the corporation has tapped a gold mine.

Said a company spokesman: "The biggest need in this country today is privacy. We live practically in each other's pockets, and if we can't do anything else, at least QuietWall can soundproof the pockets."

The QuietWall units, which retail for \$289.95 for the basic room unit, are said to offer dealer, distributor, and manufacturer a generous profit. And no one can say that \$289.95 is not a reasonable price to pay to keep out the noise of other people's TV, record players, quarrels, and squalling babies.

Detroit, December 23, 1977. Santa left an early present for the auto industry here today.

A test driver trying out a car equipped with a Hughes QuietWall unit went into a skid on the icy test track, rolled over three times, and got out shaken but unhurt. The car itself, a light supercompact,

was found to be almost totally undamaged.

Tests with sledgehammers revealed the astonishing fact that with the unit turned on, the car would not dent, and the glass could not be broken. The charge filler cap could not be unscrewed. The hood could not be raised. And neither windows nor doors could be opened till the unit was snapped off. With the unit off, the car was perfectly ordinary.

This is the first known trial of a QuietWall unit in a motor vehicle.

Standard house and apartment installations use a specially-designed basic unit to soundproof floor and walls, and small additional units to soundproof doors and windows. This installation tested today apparently lacked such refinements.

December 26, 1977. J. Paul Hughes, chairman of the board of directors of the QuietWall Corp., stated to reporters today that his firm has no intention to market the Hughes QuietWall unit for use in motor cars.

Hughes denied the Detroit report of a QuietWall-equipped test car that rolled without damage, calling it "impossible."

Hartford, January 8, 1978. Regardless of denials from the QuietWall Corporation, nationwide experiments are being conducted into the use of the corporation's sound-deadening units as a safety device in cars. Numerous letters, telegrams,

and phone calls are being received at the head offices of some of the nation's leading insurance companies here.

Hartford, January 9, 1978. Tests carried out by executives of the New Standard Insurance Group indicate that the original Detroit reports were perfectly accurate.

Cars equipped with the QuietWall units cannot be dented, shattered, scratched, or injured in any way by ordinary tools.

Austin J. Ramm, Executive Secretary of New Standard Group, stated to reporters:

"It's the damndest thing I ever saw.

"We've had so many communications, from people all over the country who claim to have connected QuietWall units to their cars, that we decided to try it out ourselves.

"We tried rocks, hammers, and so forth, on the test vehicle. When these didn't have any effect, I tried a quarter-inch electric drill and Steve Willoughby—he's our president—took a crack at the center of the windshield with a railroad pickaxe. The pickaxe bounced. My drill just slid around over the surface and wouldn't bite in.

"We have quite a few other things we want to try.

"But we've seen enough to know there definitely is truth in these reports."

New York, January 10, 1978. Myron L. Sams, president of the

Hughes QuietWall Corporation, announced today that a special automotive attachment is being put on sale throughout the country. Mr. Sams warns that improper installation may, among other things, seize up all or part of the operating machinery of the car. He urges that company representatives be allowed to carry out the installation.

Dallas, January 12, 1978. In a chase lasting an hour, a gang of bank robbers got away this afternoon with \$869,000 in cash and negotiable securities.

Despite a hail of bullets, the escape car was not damaged. An attempt to halt it at a roadblock failed, as the car crashed though without injury.

There is speculation here that the car was equipped with one of the Hughes QuietWall units that went on sale a few days ago.

Las Vegas, January 19, 1978. A gang of eight to ten criminals held up the Silver Dollar Club tonight, escaping with over a quarter of a million dollars.

It was one of the most bizarre robberies in the city's history.

The criminals entered the club in golf carts fitted with light aluminum- and transparent-plastic covers, and opened a gun battle with club employees. A short fight disclosed that it was impossible to even dent the light shielding on the golf carts. Using the club's patrons and employees as hostages, the gun-

men received the cash they demanded, rolled across the sidewalk and up a ramp into the rear of a waiting truck, which drove out of town, smashing through a hastily-erected roadblock.

As police gave chase, the truck proved impossible to damage. In a violent exchange of gunfire, no one was injured, as the police cars were equipped with newly-installed QuietWall units, and it was evident that the truck was also so equipped.

Well outside of town, the truck reached a second roadblock. The robbers attempted to smash through the seemingly flimsy barrier, but were brought to a sudden stop when the roadblock, fitted with a QuietWall unit, failed to give way.

The truck, and the golf carts within, were found to be undamaged. The bandits are now undergoing treatment for concussion and severe whiplash injuries.

The \$250,000.00 has been returned to the Silver Dollar Club, and Las Vegas is comparatively quiet once more.

New York, January 23, 1978. In a hastily-called news conference, J. Paul Hughes, chairman of the board of Hughes QuietWall Corporation, announced that he is calling upon the Federal Government to step in and suspend the activities of the corporation.

Pointing out that he has tried without success to suspend the company's operations on his own authority, Dr. Hughes stated that

as a scientist he must warn the public against a dangerous technological development, "the menacing potentialities of which I have only recently come to appreciate."

No response has as yet been received from Washington.

New York, January 24, 1978. President Myron L. Sams today acknowledged the truth of reports that a bitter internal struggle is being waged for control of the Hughes QuietWall Corporation.

Spring Corners, Iowa, January 26, 1978. Oscar B. Nelde, a farmer on the outskirts of town, has erected a barricade that has backed up traffic on the new Cross-State Highway for twenty miles in both directions.

Mr. Nelde recently lost a suit for additional damages when the highway cut his farm into two unequal parts, the smaller part containing his house and farm buildings, the larger part containing his fields.

The barricade is made of oil drums, saw horses, and barbed wire. The oil drums and saw horses cannot be moved, and act as if welded to the frozen earth. The barbed wire is weirdly stiff and immovable. The barricade is set up in a double row of these immovable obstacles, spaced to form a twenty-foot-wide lane connecting the two separated parts of Mr. Nelde's farm.

Mr. Nelde's manure spreader was seen crossing the road early today.

Heavy road machinery has failed

to budge the obstacles. The experts are stumped. However, the local QuietWall dealer recalls selling Mr. Nelde a quantity of small units recently and adds, "but no more than a lot of other farmers have been buying lately."

It may be worth mentioning that Mr. Nelde's claim is one of many that have been advanced locally

New York, January 27, 1978. The Hughes QuietWall Corporation was today reorganized as QuietWall, Incorporated, with Myron L. Sams holding the positions of president and chairman of the board of directors. J. Paul Hughes, grandson of Everett Hughes, continues as a director.

Spring Corners, Iowa, January 28, 1978. Traffic is flowing once again on the Cross-State Highway.

This morning a U. S. Army truck-mounted earth auger moved up the highway and drilled a number of holes six feet in diameter, enabling large chunks of earth to be carefully loosened and both sections of the barricade to be lifted out as units. The wire, oil drums, saw horses, and big chunks of earth, which remained rigid when lifted out, are being removed to the U. S. Army Research and Development Laboratories for study. No QuietWall units have been found, and it is assumed that they are imbedded, along with their power source, inside the masses of earth.

The sheriff, the police chief of

Spring Corners, and state and federal law enforcement agents are attempting to arrest Oscar B. Nelde, owner of the farm adjacent to the highway.

This has proved impossible, as Mr. Nelde's house and buildings are equipped with a number of QuietWall units controlled from within.

Boston, February 1, 1978. Dr. R. Milton Schummer, Professor of Sociology at Wellsford College, and a severe critic of "creeping conformism," said tonight, when questioned by reporters, that some of the effects of the QuietWall units constitute a hopeful sign in the long struggle of the individual against the State and against the forces of conformity. However, Dr. Schummer does not believe that "a mere technological gadget can affect these great movements of sociological trends."

Spring Corners, Iowa, February 2, 1978. A barbed-wire fence four feet high, fastened to crisscrossed railroad rails, now blocks the Cross-State Highway near the farm home of Leroy Weaver, a farmer whose property was cut in half by the highway, and who has often stated that he has received inadequate compensation.

It has proved impossible for highway equipment on the scene to budge either wire or rails.

Mr. Weaver cannot be reached for comment, as his house and buildings are equipped with Quiet-

Wall units, and neither the sheriff nor federal officials have been able to effect entry onto the premises.

Washington, D. C., February 3, 1978. The Bureau of Standards reports that tests on QuietWall units shows them to be essentially "stasis devices." That is to say, they prevent change in whatever material surface they are applied to. Thus, sound does not pass, because the protected material is practically noncompressible, and is not affected by the alternate waves of compression and rarefaction in the adjacent medium.

Many potential applications are suggested by Bureau of Standards spokesmen, who report, for instance, that thin slices of apples and pears placed directly inside the surface field of the QuietWall device were found totally unchanged when the field was switched off, after test periods of more than three weeks.

New York, February 3, 1978. Myron L. Sams, president of QuietWall, Incorporated, reports record sales, rising day-by-day to new peaks. QuietWall, Inc., is now operating factories in seven states, Great Britain, the Netherlands, and West Germany.

Spring Corners, Iowa, February 4, 1978. A U. S. Army truck-mounted earth auger has again removed a fence across the Cross-State Highway here. But the giant auger itself

has now been immobilized, apparently by one or more concealed stasis (QuietWall) devices.

As the earth auger weighs upwards of thirty tons, and all the wheels of truck and trailer appear to be locked, moving it presents no small problem.

Los Angeles, February 5, 1978. Police here report the capture of a den of dope fiends and unsavory characters of all descriptions, after a forty-hour struggle.

The hideout, known as the "Smoky Needle Club," was equipped with sixteen stasis devices manufactured by QuietWall, Inc., and had an auxiliary electrical supply line run in through a drain pipe from the building next door. Only when the electrical current to the entire neighborhood was cut off were the police able to force their way in.

New York, February 5, 1978. Myron L. Sams, president of QuietWall, Inc. announced today a general price cut, due to improved design and volume production economies, on all QuietWall products.

In future, basic QuietWall room units will sell for \$229.95 instead of \$289.95. Special small stasis units, suitable for firming fence posts, reinforcing walls, and providing barred-door household security, will retail for as low as \$19.95. It is rumored that this price, with improved production methods, still provides an ample profit for all

concerned, so that prices may be cut in some areas during special sales events.

Spring Corners, Iowa, February 6, 1978: A flying crane today lifted the immobilized earth auger from the eastbound lanes of Cross-State Highway.

A total of fourteen small stasis units have thus far been removed from the auger, its truck and trailer, following its removal from the highway by air. Difficulties were compounded by the fact that each stasis unit apparently "freezes" the preceding units applied within its range. The de-stasis experts must not only locate the units. They must remove them in the right order, and some are very cleverly hidden.

Seaton Bridge, Iowa, February 9, 1978. The Cross-State Highway has again been blocked, this time by a wall of cow manure eighty-three feet long, four feet wide at the base, and two-and-one-half feet high, apparently stabilized by imbedded stasis units, and as hard as cement. National Guard units are now patrolling the Seaton Bridge section of road to either side of the block.

New York, February 10, 1978. Representatives of QuietWall, Inc., report that study of stasis devices removed from the auger at Spring Center, Iowa, reveals that they are "not devices of QW manufacture,

but crude, cheap bootleg imitations. Nevertheless, they work."

Spring Center, Iowa, February 12, 1978. The Cross-State Highway, already cut at Seaton Bridge, is now blocked in three places by walls of snow piled up during last night's storm by farmers' bulldozers, and stabilized by stasis devices. Newsmen who visited the scene report that the huge mounds look like snow, but feel like concrete. Picks and shovels do not dent them, and flame throwers fail to melt them.

New York, February 15, 1978. Dr. J. Paul Hughes, a director of QuietWall, Inc., tonight reiterated his plea for a government ban on stasis devices. He recalled the warning of his inventor grandfather, Everett Hughes, and stated that he intends to spend the rest of his life "trying to undo the damage the device has caused."

New York, February 16, 1978. Myron L. Sams, president of QuietWall, Inc., announced today that a fruit fly had been kept in stasis for twenty-one days without suffering visible harm. QW's research scientists, he said, are now working with the problem of keeping small animals in stasis. If successful, Sams said, the experiments may open the door to "one-way time-travel," and enable persons suffering from serious diseases to wait, free from pain, until such time as a satisfactory cure has been found.

Bonn, February 17, 1978. Savage East German accusations against the West today buttressed the rumors that "stasis-unit enclaves" are springing up like toadstools throughout East Germany.

Similar reports are coming in from Hungary, while Poland reports a number of "stasis-frozen" Soviet tanks.

Havana, February 18, 1978. In a frenzied harangue tonight, "Che" Garcia, First Secretary of the Cuban Communist Party, announced that the government is erecting "stasis walls" all around the island, and that "stasis blockhouses" now being built will resist "even the Yankees' worst hydrogen weapons." In a torrent of vitriolic abuse, however, Mr. Garcia threatened that "any further road blocks and centers of degenerate individualism that spring up will be eradicated from the face of the soil of the motherland by blood, iron, sweat, and the forces of monolithic socialism."

There have been rumors for some time of dissatisfaction with the present regime.

Mr. Garcia charged that the C.I.A. had flagrantly invaded Cuban air space by dropping "millions of little vicious stasis units, complete with battery packs of fantastic power," all over the island, from planes which could not be shot down because they were protected by "still more of these filthy sabotage devices."

Des Moines, February 21, 1978. The Iowa state government following the unsuccessful siege of four farm homes near the Cross-State Highway today announced that it is opening new hearings on land-owners' compensation for land taken for highway-construction purposes.

The governor appealed to owners of property adjoining the highway to be patient, bring their complaints to the capital, and meanwhile open the highway to traffic.

Staunton, Vt., February 23, 1978. Hiram Smith, a retired high school science teacher whose family has lived on the same farm since before the time of the Revolution, was ordered last fall to leave his family home.

A dam is to be built nearby, and Mr. Smith's home will be among those inundated.

At the time of the order, Mr. Smith, who lives on the farm with his fourteen-year-old grandson, stated that he would not leave "until carried out dead or helpless."

This morning, the sheriff tried to carry out the eviction order, and was stopped by a warning shot fired from the Smith house. The warning shot was followed by the flight of a small, battery-powered model plane, apparently radio-controlled, which alighted about two thousand yards from the Smith home, near an old apple orchard.

Mr. Smith called to the sheriff

to get out of his car and lie down, if the car was not stasis-equipped, and in any case to look away from the apple orchard.

There was a brilliant flash, a shock, and a roar which the sheriff likened to the explosion of "a hundred tons of TNT." When he looked at the orchard, it was obscured by a pink glow and boiling clouds, apparently of steam from vaporized snow.

Mr. Smith called out to the sheriff to get off the property, or the next "wink bomb" would be aimed at him.

No one has been out to the Smith property since the sheriff's departure.

New York, February 25, 1978. Mr. Myron L. Sams, president of Quiet-Wall, Inc., announced today that "there is definitely no connection between the Staunton explosion and the QW Corp. stasis unit. The stasis unit is a strictly defensive device and cannot be used for offensive purposes."

New York, February 25, 1978. Dr. J. Paul Hughes tonight asserted that the "wink-bomb" exploded at Staunton yesterday, and now known to have left a radioactive crater, "probably incorporated a stasis unit." The unit was probably "connected to a light metallic container holding a small quantity of radioactive material. It need not necessarily be the radioactive material we are accustomed to think

of as suitable for fission bombs. It need not be the usual amount of such material. When the stasis unit was activated by a radio signal or timing device, high-energy particles thrown off by the radioactive material would be unable to pass out through the container, now in stasis, and equivalent to a very hard, dense, impenetrable, nearly ideal boundary surface. The high-energy particles would bounce back into the interior, bombarding the radioactive material. As the population of high-energy particles within the enclosing stasis-field builds up, the radioactive material, regardless of its quantity, reaches the critical point. Precisely what will happen depends on the radioactive material used, the size of the sample, and the length of the 'wink'—that is, the length of time the stasis field is left on."

Dr. Hughes added that "this is a definite, new, destructive use of the stasis field, which Mr. Myron Sams assures us is perfectly harmless."

Montpelier, Vt., February 26, 1978. The governor today announced temporary suspension of the Staunton Dam Project, while an investigation is carried out into numerous landowners' complaints.

Moscow, February 28, 1978. A "certain number" of "isolated cells" of "statis-protected character" are admitted to have sprung up within the Soviet Union. Those

that are out of the way are said to be left alone, on the theory that the people have to come out sometime. Those in important localities are being reduced by the Red Army, using tear gas, sick gas, toothache gas, flashing searchlights, "war of nerves" tactics, and, in some cases, digging out the "cell" and carrying it off wholesale. It is widely accepted that there is nowhere near the amount of trouble here as in the satellite countries, where the problem is mounting to huge proportions.

Spring Corners, Iowa, May 16, 1978. The extensive Cross-State Highway claims having been settled all around, traffic is once again flowing along the highway. A new and surprising feature is the sight of farm machinery disappearing into tunnels constructed under the road to allow the farmers to pass from one side to the other.

Staunton, Vt., July 4, 1978. There was a big celebration here today as the governor and a committee of legislators announced that the big Staunton Dam Project has been abandoned, and a number of smaller dams will be built according to an alternate plan put forth earlier.

Bonn, August 16, 1978. Reports reaching officials here indicate that the East German government, the Hungarian government, and also to a considerable extent the Polish government, are having increasing

difficulties as more and more of the "stasis-unit enclaves" join up, leaving the governments on the outside looking in. Where this will end is hard to guess.

Washington, September 30, 1978. The Treasury Department sent out a special "task force" of about one hundred eighty men this morning. Their job is to crack open the mushrooming Anti-Tax League, whose membership is now said to number about one million enthusiastic businessmen. League members often give Treasury agents an exceedingly rough time, using record books and files frozen shut with stasis units, office buildings stasis-locked against summons-servers, stasis-equipped cars which come out of stasis-equipped garages connected with stasis-locked office buildings, to drive to stasis-equipped homes where it is physically impossible for summons-servers to enter the grounds."

Princeton, N. J., October 5, 1978. A conference of leading scientists, which gathered here today to exchange views on the nature of the stasis unit, is reported in violent disagreement. One cause of the disagreement is the reported "selective action" of the stasis unit, which permits ordinary light to pass through transparent bodies, but blocks the passage of certain other electromagnetic radiations.

Wild disorders broke out this afternoon during a lecture by Dr.

J. Paul Hughes, on the "Quasi-Electron Theory of Wave Propagation." The lecture was accompanied by demonstration of the original Everett Hughes device, powered by an old-fashioned generator driven by the inventor's original steam engine. As the engine gathered speed, Dr. Hughes was able to demonstrate the presence of a nine-inch sphere of completely reflective material in the supposedly-empty focus of the apparatus. This sphere, Dr. Hughes asserted, was the surface of a space totally evacuated of quasi-electrons, which he identified as "units of time."

It was at this point that the disturbance broke out.

Despite the disorder, Dr. Hughes went on to explain the limiting value of the velocity of light in terms of the quasi-electron theory, but was interrupted when the vibration of the steam engine began to shake down the ceiling.

There is a rumor here that the conference may recess at once without issuing a report.

Washington, D. C., August 16, 1979. Usually reliable sources report that the United States has developed a "missile screen" capable of destroying enemy missiles in flight, and theoretically capable of creating a wall around the nation through which no enemy projectile of any type could pass. This device is said to be based on the original Everett Hughes stasis-unit, which creates a perfectly rigid barrier of

variable size and shape, which can be projected very rapidly by turning on an electric current.

Other military uses for stasis devices include protection of missile sites, storage of food and munitions, impenetrating of armor plate, portable "turtle-shields" for infantry, and quick-conversion units designed to turn any ordinary house or shed into a bombardment-proof strongpoint.

Veteran observers of the military scene say that the stasis unit completely reverses the advantage until recently held by offensive, as opposed to defensive, weapons. This traditionally alternating advantage, supposed to have passed permanently with the development of nuclear explosives, has now made one more pendulum swing. Now, in place of the "absolute weapon," we have the "absolute defense." Properly set up, hydrogen explosions do not dent it.

But if the nation is not to disintegrate within as it becomes impregnable without, officials say we must find some effective way to deal with stasis-protected cults, gangsters, antitax enthusiasts, seceding rural districts, space-grabbers, and proprietors of dens. Latest problem is the traveling roadblock, set up by chiselers who select a busy highway, collect "toll" from motorists who must pay or end up in a traffic jam, then move on quickly before police have time to react, and stop again in some new loca-

tion to do the same thing all over. There must be an answer to all these things, but the answer has yet to be found.

Boston, September 2, 1979. Dr. R. Milton Schummer, Professor of Sociology at Wellsford College, spoke out against "galloping individualism" to an audience of six hundred in Swarton Hall last night.

Professor Schummer charged that America, once the land of co-operative endeavor, is now "a seething hotbed of rampant individualists, protestors, quick-rich artists, and minute-men of all kinds, each over-reacting violently from a former condition which may have seemed like excessive conformism at the time, but now in the perspective of events appears as a desirable cohesiveness and unity of direction. The result today is the fractionating American with synthetic rough edges and built-in bellicose sectionalism."

What this country needs, said Dr. Schummer, is "co-ordination of aims, unity of purpose, and restraint of difference." But, he concluded, "the reaction is too violent. The trend, like the tide, cannot be reversed by human efforts. In three years, this nation has gone from cohesion to fractionation, from interdependence to chaos, from federalism to splinterism, and the end is not yet. One shrinks at the thought of what the next hundred years may bring." ■ ●

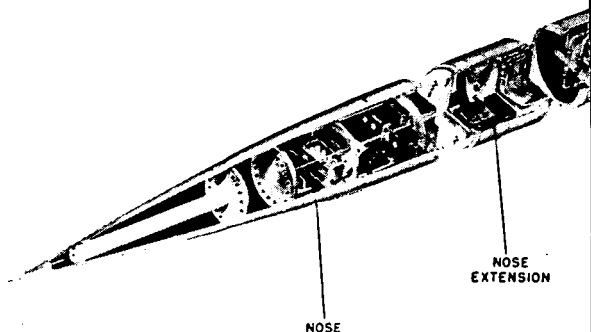
A piece of torn, textured paper with irregular, jagged edges. The paper is light gray with some darker, mottled areas. The word "hypergolicity" is printed in a bold, black, serif font across the center of the paper. The paper is set against a plain white background.

hypergolicity

"Hypergolic" is a new technical word. Very simple definition, really—a sort of automatic-right-now-white-hot incendiary temperament!

BY

EDWARD C. WALTERSCHEID



■ The files of the American Rocket Society contain photographs which show that one of the earliest ignition devices used for liquid-fueled rockets in this country consisted of a prayer and a gasoline-soaked rag. While this worked a portion of the time, it also added considerable spice to the launchings in that someone always had to get close enough to light the rag. As the rockets got larger, this method got less and less popular until it now

seems to have died out completely.

Ignition has been called the process of getting a rocket off to a good start and this is essentially true. However, the larger rockets become, the more complex the problem of ignition gets to be. Because of the high rate of propellant flow in present liquid-fueled rockets such as the Atlas or Titan II, ignition timing must be extremely precise. When faulty ignition occurs in one of these rockets, it can lead to one

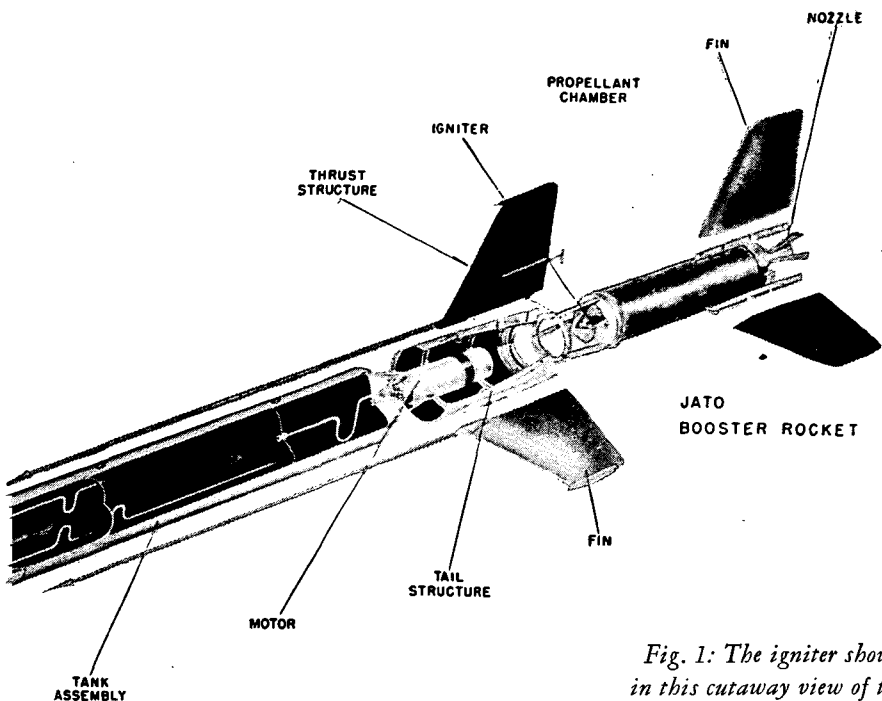


Fig. 1: The igniter shown in this cutaway view of the Aerobee sounding rocket is for the JATO solid propellant booster rocket.

Ignition in the Aerobee engine is hypergolic. (Aerojet-General)

of the most expensive pyrotechnic displays yet devised by man.

Size is not the only factor which has caused ignition problems. The use of high-energy propellants greatly decreases the safe time lag which may exist between the start of propellant flow and ignition. Ignition difficulties have been among the chief problems which have delayed the development of a liquid oxygen/liquid hydrogen engine.

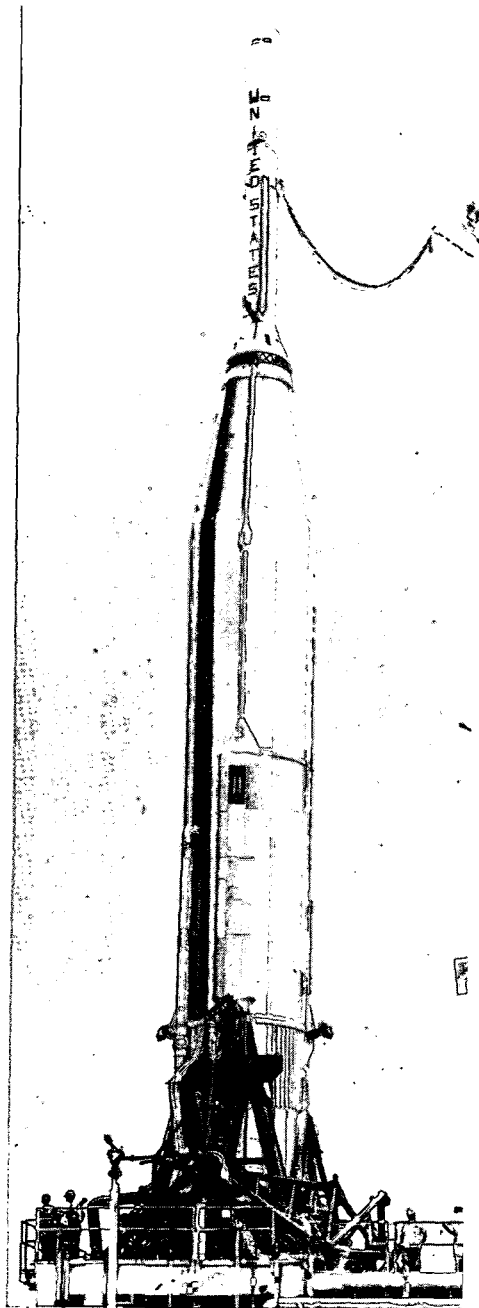
How then is ignition provided in

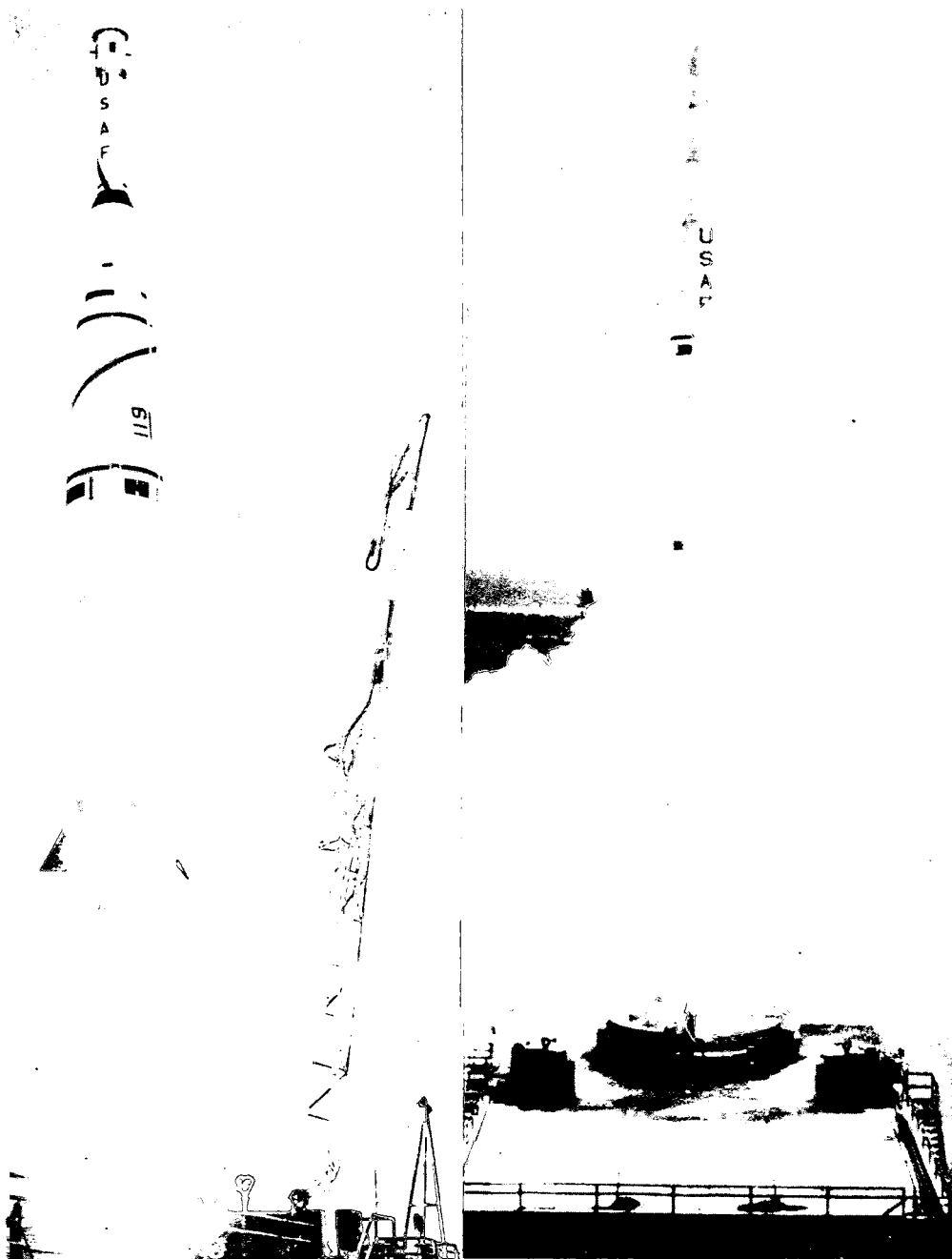
liquid-fueled rocket engines? Some make use of spark plugs or glow plugs much in the manner that a gasoline or Diesel engine does. Others use pyrotechnic devices. These consist of various forms of powder charges which can be ignited by electric current or hot wires. The burning charge then provides a source of ignition for the rocket engine itself. This is essentially the type of ignition used in all solid propellant rockets.

Fig. 2: This is an Atlas-Able lunar probe prior to launch. Hypergolic ignition is used in both the Able state and the attitude control rockets on the probe. (NASA)

Fig. 3: The combination of a first-stage Thor with a second-stage Able has successfully placed many U. S. satellites into orbit. Able is fueled by the hypergolic combination of IWFNA and UDMH. (Official U. S. Air Force Photo)

Fig. 4: An Ablestar upper stage, similar to the one shown on this Thor-Ablestar rocket, was the first rocket engine ever to be restarted in space. This feat was accomplished through the use of hypergolic propellants. (Aerojet-General)





HYPERGOLICITY

87

There is still a third method of ignition which may be used with certain propellant combinations. This method, which is extremely reliable, is marked by the complete absence of any visible ignition system. Absurd, you say? Not at all, for I qualified the statement by the word *visible*. No external source of power is required and hence no visible ignition system because ignition is dependent only upon a particular property of the propellant combination. This advantageous property is called hypergolicity and is the reason for this article.

Hypergolicity is the ability of a fuel and oxidizer to ignite spontaneously upon contact. For our purposes spontaneous ignition is defined as ignition which occurs within 50 milliseconds after oxidizer and fuel contact. With this definition in mind, hypergolicity does not have a variable value like other propellant criteria such as density, vapor pressure, freezing point, et cetera. It is, rather, a defined property which either does or does not exist with regard to any liquid propellant combination.

Hypergolicity has several advantageous features for the rocket engineer. Propellants that ignite smoothly upon contact and without pressure surges cannot accumulate in large quantities in a thrust chamber with resultant later explosions. As stated, no external source of power is necessary to start combustion.

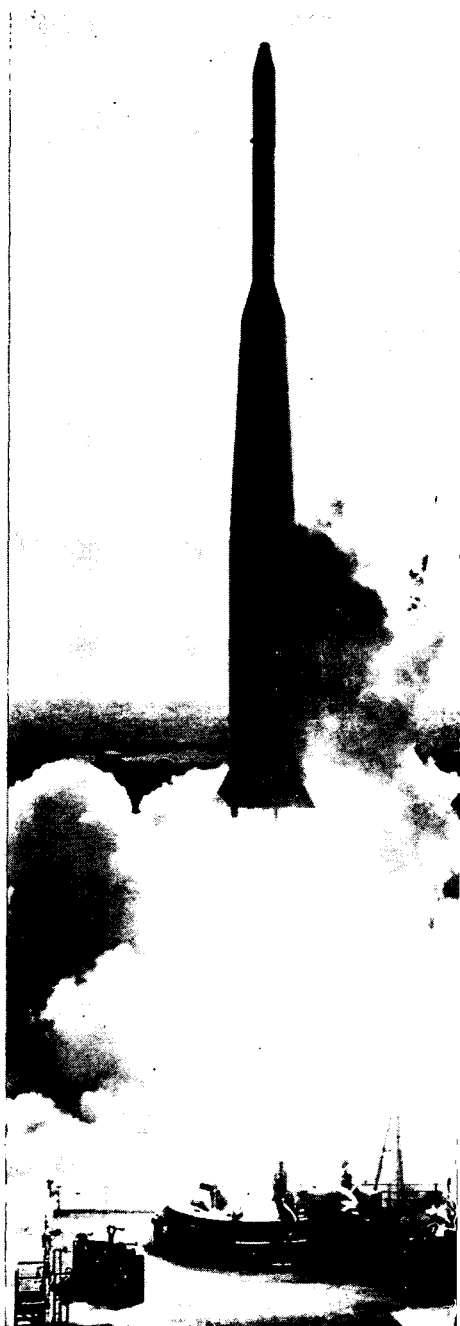


*Fig. 5: You guessed it!
Hypergolic propellants are used
to fuel the Delta stage of
this Thor-Delta rocket shown launching
Explorer X into orbit.
(Official U. S. Air Force Photo)*

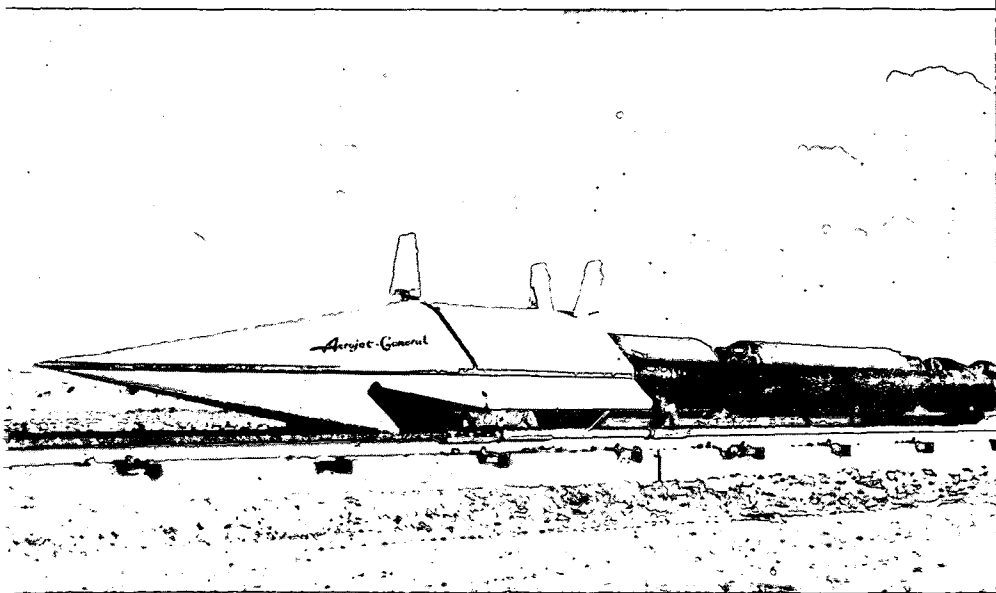
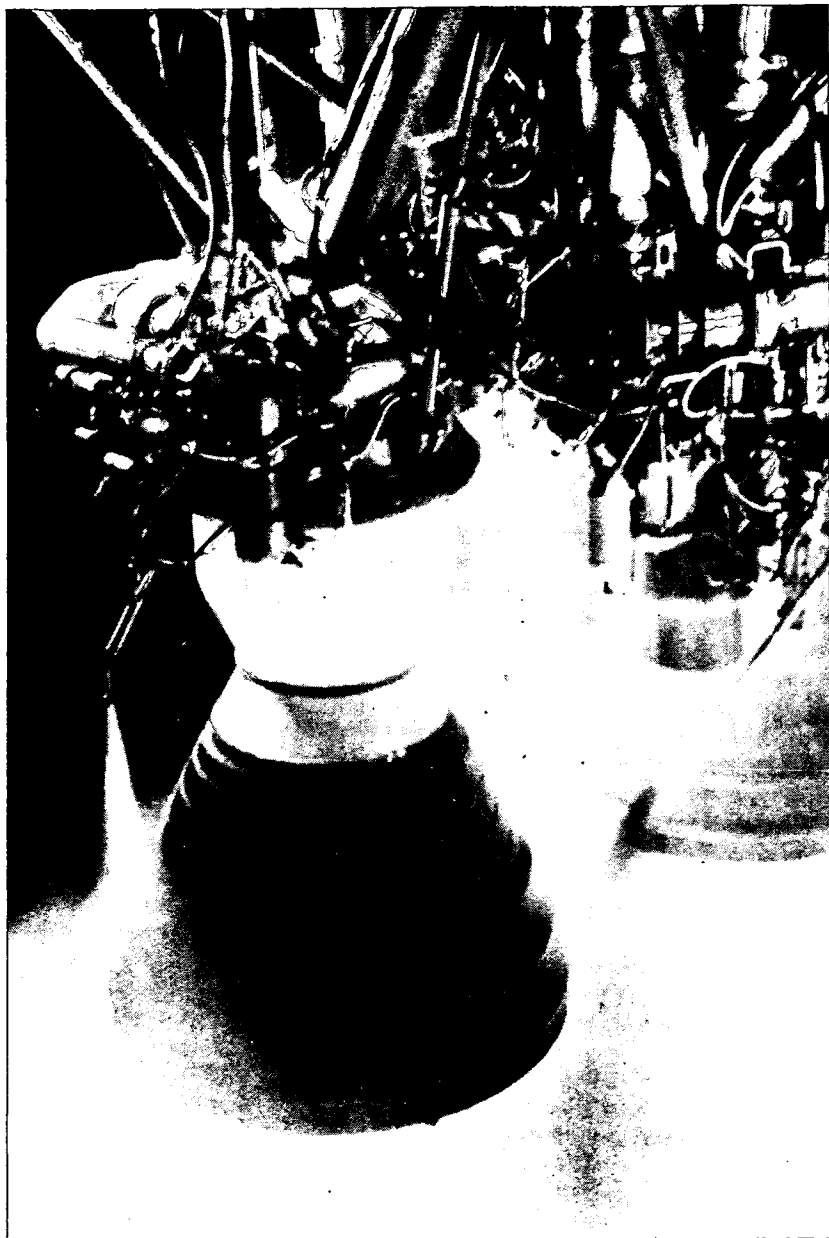


*Fig. 6: Rocket sleds such as this one are used to test aircraft
and missile guidance systems and component parts.
Nitric acid and JP-X are used as propellants for these sleds.
A mixture of aniline and furfural alcohol is used as a starting fuel. (Aerojet-General)*



*Fig. 7: The center chamber is the sustainer engine of the Atlas ICBM.
Twin chambers on either side are the booster engine.
The reaction of liquid oxygen with hypergolic slugs serves as the source
of ignition for all three chambers. (Rocketdyne)*

*Fig. 8: This is what boosts
the first-stage—(Rocketdyne)*



Perhaps the greatest single advantage a hypergolic ignition system displays is the ability to provide multiple starts. This property is of extreme importance where interrupted firings are necessary as in the orbiting of various space probes.

The Air Force Thor-Ablestar two-stage rocket provides an example of a system in which interrupted firings play an important part. When the Ablestar separates from the Thor first-stage in flight, it normally fires for two hundred seconds or more, shuts down, coasts upward on the initial momentum for about twenty minutes, then restarts and fires for a short period before injecting its scientific payload into orbit. The Ablestar restart capability is provided by the use of unsymmetrical dimethylhydrazine and inhibited red fuming nitric acid, a hypergolic combination.

While many of our present rocket systems make use of hypergolic ignition, the method is relatively new. Pyrotechnic and electric ignition systems are much older and continue to be used quite extensively. However there are inherent disadvantages in these systems. One of the first discoveries of hypergolic ignition in this country resulted from difficulties with an electric ignition system.

Ignition of a rocket engine is somewhat different from that of the familiar automobile engine. Improper ignition timing in the car en-

gine may cause poor performance and engine wear, but there won't be any spectacular side effects. Unfortunately, this is not the case with rocket engines. Delayed or improperly timed ignition in a rocket often leads to what rocket people call a hard start. This means that it has a tendency to explode.

Hard starts occur in rocket engines because they are much more vulnerable than other types of engines to the effects of variables during the ignition period. They operate at much higher propellant flow rates and the combustion chambers are relatively small. Because of the high flow rates, the combustion chamber contains very high concentrations of reactants which are frequently quite close to the stoichiometric ratio. (Stoichiometric ratio is the oxidizer/fuel ratio at which complete chemical reaction occurs.) Therefore, ignition must occur promptly after propellant flow begins or over-pressurization leading to explosive hard starts may easily result.

In 1942, a group at California Institute of Technology learned about hard starts through sad experience. They were working on a 1,000-pound thrust, liquid-fueled engine for use in assisting airplane take-offs. Gasoline was chosen as the fuel and concentrated nitric acid was used as the oxidizer. An electric ignition system was used to initiate combustion. However, in seven out of eight test firings the start was hard.

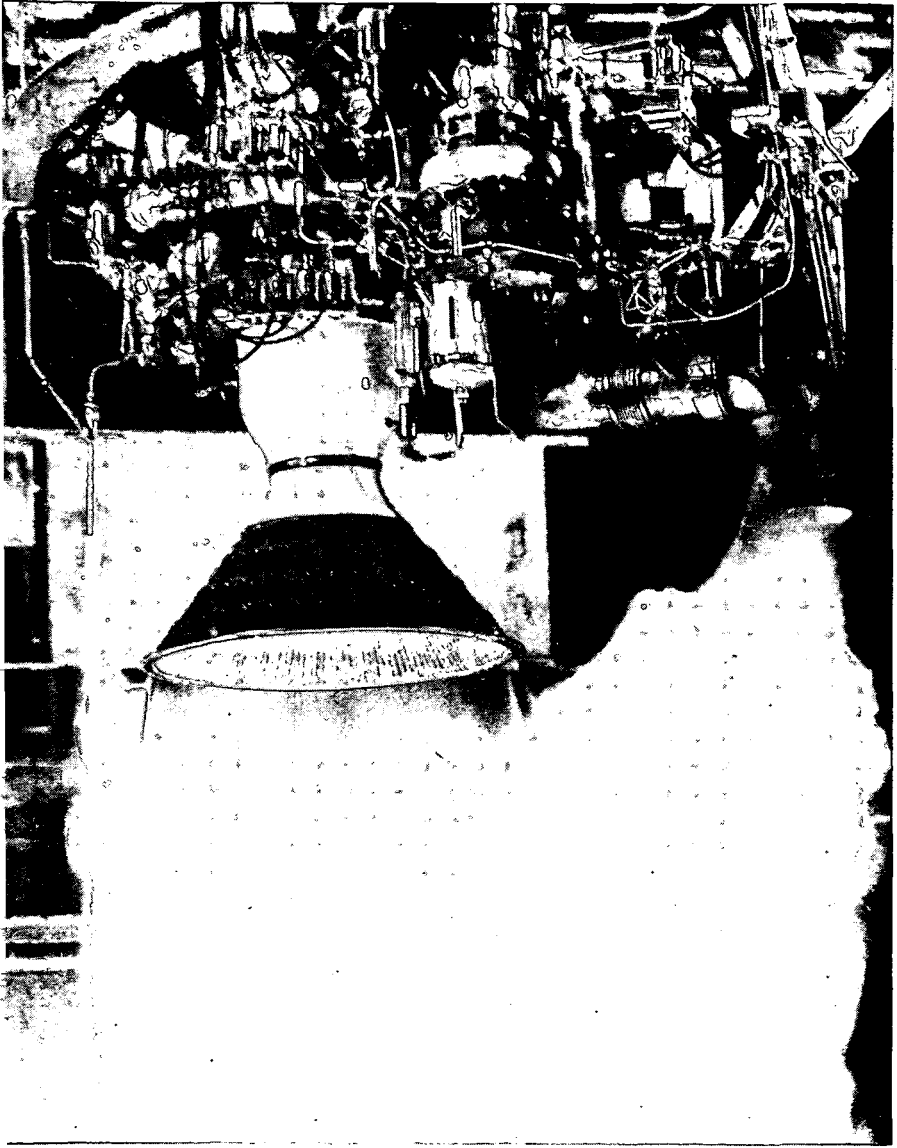
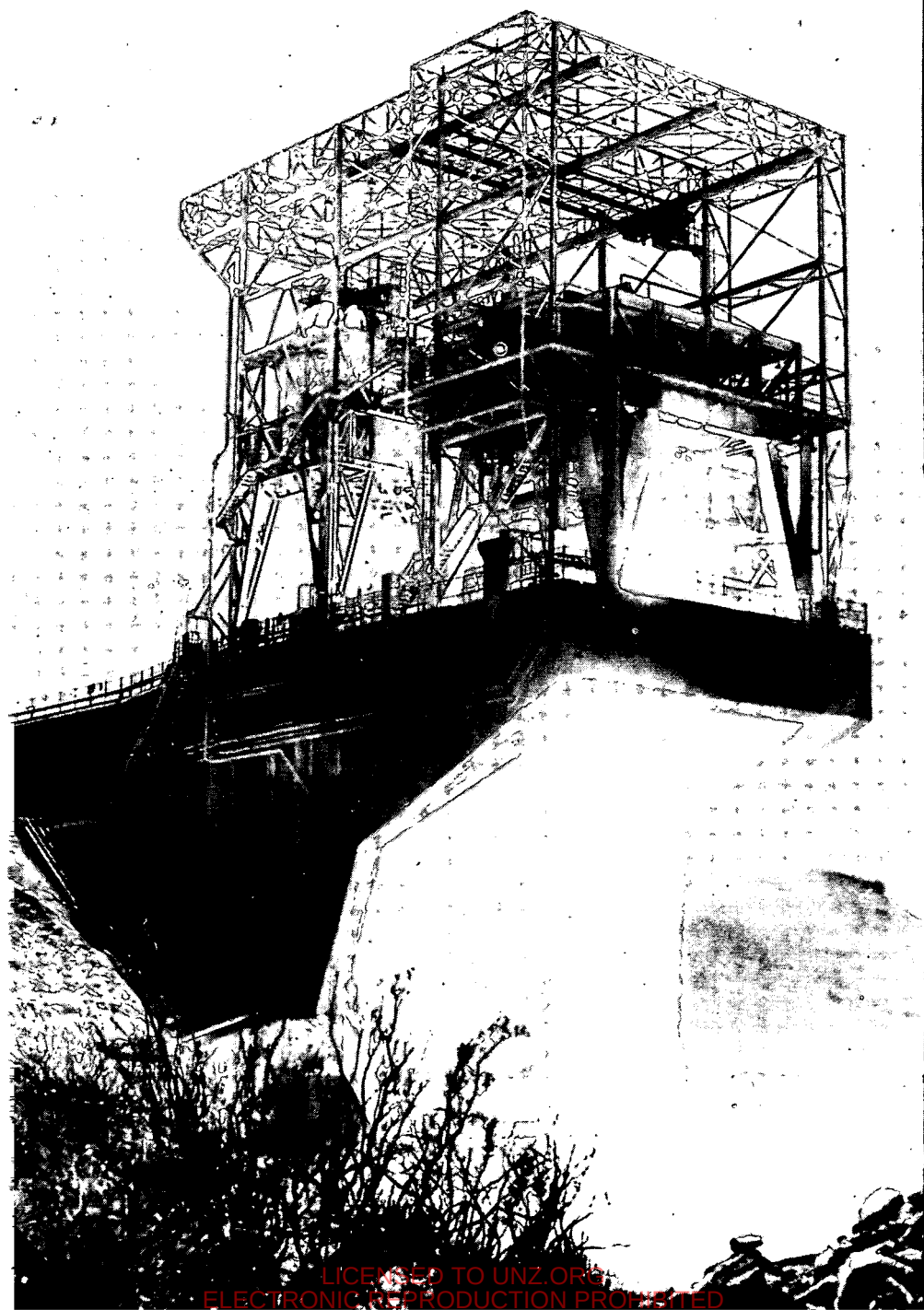


Fig. 9—and this is what boosts the second-stage of Titan II, America's most powerful ICBM. Ignition is hypergolic in both stages. (Rocketdyne)

HYPERGOLICITY

93



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Faulty ignition appeared to be the culprit. As a possible solution to the problem, various fuel additives were suggested. Aniline was among those tried and it solved the problem in a way no one had anticipated. It did away with the electric ignition system.

Aniline on contact with concentrated nitric acid ignites spontaneously. The advantages of this were obvious, and aniline was substituted for gasoline as a fuel in the rocket-assisted take-off units. Since aniline had originally been suggested only as an additive to aid in smoother ignition, this was somewhat analogous to solving the problem of knocking in a gasoline engine by substituting tetraethyl lead for the gasoline. Nonetheless, the combination was successful and after mechanical difficulties were eliminated, no further hard starts were experienced.

The discovery that aniline and nitric acid spontaneously ignite together was one of the first discoveries of hypergolicity in the United States and set off a search for other oxidizer/fuel combinations which would be hypergolic. By the end of World War II various aliphatic and aromatic amines—aniline is an aro-

matic amine—were found to ignite spontaneously in the presence of concentrated nitric acid. Certain mercaptans, thiophosphites, metal carbonyls, and furfuryl alcohol were also found to ignite with concentrated nitric acid.

It is interesting to note that the spontaneous ignition of certain oxidizer/fuel combinations came as a surprise in this country. In 1939, an article which had previously been published in France was published in the journal of the American Rocket Society. In the article, A. Ananoff describes the workings of a liquid-fueled rocket engine and suggests that a very convenient ignition method would be one in which the fuel ignites upon contact with the oxidizer.

In any case, the American discoveries were not new. The Germans had anticipated them by five years. German rocket researchers did extensive research with propellants immediately before and during World War II. They discovered as early as 1935 that various fuels and oxidizers would spontaneously ignite when mixed. In addition to making similar discoveries concerning nitric acid and amine compounds, they found that hydrogen peroxide would burn spontaneously in the presence of hydrazine hydrate. A hypergolic combination of hydrogen peroxide with a mixture of hydrazine hydrate and ethyl alcohol fueled the world's first operational rocket plane. This was the German ME 163B which was used

Fig. 10: More than one million pounds of thrust streams from F-1 rocket engine during the first series of tests of complete flyable system. The main chamber of the F-1 is ignited by a hypergolic slug. (Rocketdyne)

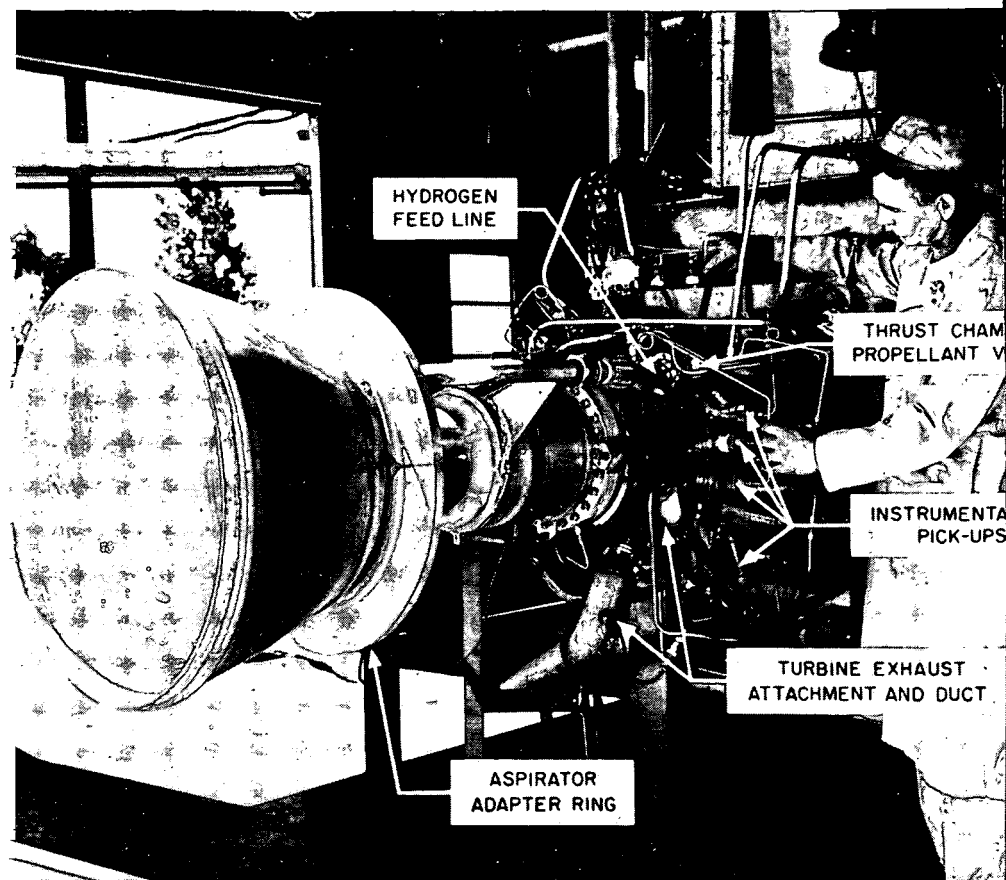


Fig. 11: This hydrogen/fluorine engine which has been successfully static tested produces the highest Isp of any chemically fueled rocket. Ignition is dependent upon the hypergolic reaction of hydrogen with fluorine. (Bell Aerosystems)

as a fighter in the latter stages of World War II.

Propellants were categorized as either anergoles or hypergoles by German rocket scientists. An anergolic propellant denoted a propellant combination of a liquid fuel and a liquid oxidizer that was not spontaneously combustible or self-igniting. Hypergoles were those propellant combinations that would spontaneously ignite. The German usage has been adopted in this country and the term hypergolic now denotes that a propellant combination will spontaneously ignite when mixed.

German propellant development centered around three oxidizers: liquid oxygen, nitric acid, and hydrogen peroxide. Liquid oxygen was never seriously considered as being hypergolic with any fuel combination. (This was one of the few instances where the Germans appear to have missed a bet in their propellant program. A hypergolic reaction of liquid oxygen with an organometallic compound acts as the ignition source for the Atlas ICBM. Various hypergoles of both nitric acid and hydrogen peroxide were developed and used.)

Around 1100 hypergolic combinations were tested in Germany prior to the end of the war. Most of the fuels used in these combinations consisted of mixtures of compounds known to spontaneously ignite with the oxidizer under consideration. Mixtures were used because they generally provided the

best all-around properties desirable in a rocket fuel. Traces of metal salts were frequently added to the oxidizer in order to lower the ignition delay time.

This brings up a point which should be better defined. For the purposes of this article, spontaneous ignition has been defined as ignition occurring within fifty milliseconds after contact of fuel and oxidizer. This is not strictly true, since many materials will spontaneously ignite over time intervals which are much longer than this. However, for use as rocket propellants, the maximum acceptable ignition lag for most spontaneously-igniting combinations is about 50 milliseconds. Safe and reliable ignition is no longer provided when ignition delays exceed this value.

Short ignition delay times are therefore advantageous. Some combinations have ignition delays of less than two milliseconds, which in effect means that ignition occurs almost simultaneously with mixing.

In evaluating hypergolic propellants, ignition delays are determined as accurately as possible. The usual criterion for ignition is the appearance of flame or a sudden rise in temperature, pressure, or some other easily measured property. Because of the nature of the ignition process, the pressure and temperature rise and light emission all take place within an interval which is usually quite small com-



Fig. 12: These tank trucks are used to ship fluorine, the most reactive chemical propellant known. The tanks are double-walled with the outer tank containing liquid nitrogen in order to keep the liquid fluorine below its boiling point of -306°F . (Allied Chemical)

pared with the induction period—ignition delay time. Thus, it matters very little which of these is used to detect an ignition.

While many different methods have been used to measure the ignition delays of liquid rocket propellants, they all consist of bringing the reactants together in some way and observing the length of time it takes for them to go *whoosh*. During World War II, the Germans used variations of a drop-type apparatus to measure ignition delay. These dropped a small amount of one reactant onto the other and recorded electrically or mechanically the interval between contact and ignition.

Although drop tests have been used extensively, various other methods have been used with equal success. What is meant by success is somewhat open to conjecture. It's not the easiest thing in the world to measure in milliseconds when ignition occurs—especially when there is still some doubt as to just exactly what ignition is in the first place. In any case, a different method consists of an impinging jet apparatus. Two streams of reactants are allowed to intersect to form a single stream. Ignition delay is measured by the distance the combined stream falls under gravity before the mixture ignites.

In general, three factors, temperature, pressure, and rate of mixing influence ignition delay. Since temperature affects the rate of any chemical reaction, it has a marked

effect on combustion which is manifestly a chemical reaction. Because combustion is dependent upon the external temperature, any fuel/oxidizer combination will spontaneously ignite if the surrounding temperature is sufficiently high. Therefore, in essence, every propellant combination is hypergolic at high enough temperatures.

For most propellants, an external source of power is used to raise the ambient temperature to a point where ignition will occur. This is precisely what happens when pyrotechnic or electric ignition systems are used. Ambient temperatures as far as the propulsion engineer is concerned today range from about -65° to over 150°F . Generally, ignition delay for hypergolic propellants is longer at -65°F than at, say 80°F . For many normally hypergolic propellants, ignition delays exceed 50 milliseconds at low temperatures.

However, propellant combinations today are tailored for specific applications and propellants which cannot be used at temperatures below a certain point may have wide applications where ambient temperatures are kept sufficiently high. Nitrogen tetroxide and hydrazine provide an example of a hypergolic combination which is in extensive use and yet which is useless at low temperatures. The problem here is that both nitrogen tetroxide and hydrazine freeze at temperatures below 11°F .

Pressure affects ignition delay much in the manner that temperature does, although to a lesser degree. Propellants that are hypergolic at atmospheric pressure may no longer be so at ambient pressure corresponding to an altitude of 100,000 feet. Higher pressures tend to reduce ignition delay while pressures below atmospheric increase it.

The effect of mixing rates on hypergolic ignition is not at all what might be expected. It might naturally be assumed that the faster mixing occurs, the shorter the ignition delay is; however, this is not always the case. In fact, very-rapid mixing frequently appears to suppress hypergolic ignition. German experimenters during World War II stated that generally hypergoles cannot be ignited by quick or intimate mixing in the stoichiometric ratio. They also found that the finer the reactants are distributed by the injector the longer the ignition delay is.

Nitric acid and amines were for years the only seriously considered hypergolic propellant combinations. As a consequence, until recently, most of the ignition studies reported in the unclassified literature deal with nitric acid oxidizers and amine-type fuels. (A considerable portion of the propellant research done in this country is classified.)

These studies suggest that the hypergolic ignition of amines with nitric acid is a three-stage process:

1. There is an immediate initial reaction between the amine and

acid which is essentially completed during the mixing process. This reaction produces some heat and results in vaporization of some of the reactants.

2. This is followed by the induction period during which the pressure and presumably the temperature remain relatively constant, but chemical reactions leading to ignition are taking place.
3. Ignition occurs and temperature and pressure rise abruptly to high values.

It might be well to mention at this point that there are various types of nitric acid. Nitric acids containing less than five per cent of water are known as fuming. When the high strength acid contains dissolved oxides of nitrogen, it is referred to as Red Fuming Nitric Acid (RFNA). If these oxides are not present, the acid is known as White Fuming Nitric Acid (WFNA). When a small amount of hydrofluoric acid—the stuff that etches glass—is added to inhibit corrosive properties, the two types of acid are said to be inhibited and are designated as either IWFNA or IRFNA.

All these types of nitric acid have been used as oxidizers in rocket engines. The choice of a type of nitric acid depends largely upon the physical properties which are considered best for a particular application. Consequently, the term nitric acid is a loose one. When referring to nitric acid as a propellant,

the proper designation as to type is essential. The same fuel may have very different ignition delays with the different types of nitric acid.

The hypergolic propellant systems of World War II are today as outdated as the V-2 rocket. Specific impulse (Isp), which indicates the efficiency of a rocket engine, has been greatly increased. Most hypergolic combinations now have actual specific impulses 50 to 60 seconds greater than those of World War II. Today's hydrogen/fluorine system has an Isp approximately 150 seconds higher than that of the aniline/nitric acid system. (If you are curious as to why Isp is measured in seconds, it is defined as being equal to pounds of thrust developed per pound of propellant consumed per second.)

In 1945 the Wac Corporal was considered to be a very sophisticated American rocket. Its aniline/nitric acid engine developed an Isp of about 195 seconds. The German ME 163 rocket fighter developed a maximum Isp of 175 seconds. These seem rather meek when compared with the specific impulses of present hypergolic systems listed in Table I.

Higher Isp has resulted not only from more reactive propellants but also from higher chamber pressures. The ME 163 engine operated at a maximum combustion chamber pressure of 315 pounds at atmospheric pressure. The specific impulses shown in Table I are all calculated with a chamber pressure of

1,000 pounds at atmospheric pressure. If the Isp of the hydrogen/fluorine system had been calculated at 300 pounds of chamber pressure, it would have been 325 seconds instead of 369 seconds. Thus a 700-pound increase in chamber pressure results in a thirteen per cent increase in specific impulse.

The high-energy propellant systems have received consideration only for about the past five years. Most of them had been at least theoretically considered after World War II, but their disadvantages were quite enough to preclude their use until technology caught up with them.

The fact that a propellant system is hypergolic does not in itself mean that the combination is a good one. In general, hypergolic propellants should possess the same desirable features as their non-hypergolic brethren. Until fairly recently, hypergoles while having comparable or higher specific impulse lagged behind anergoles in other desirable features.

The liquid oxidizer, fluorine, serves as perhaps the most extreme example of this fact. Fluorine is the most reactive substance known. Not only is it hypergolic with the fuels listed in Table I, but it will also spontaneously ignite with almost all organic compounds. It reacts violently with concrete, which most of us consider to be a fairly inert material. With hydrogen it gives the highest Isp of any chemical bi-propellant combination.

Table I
Hypergolic Liquid Propellant Combinations

OXIDIZER	FUEL	ACTUAL SPECIFIC IMPULSE*
Fluorine	Ammonia	321
	Hydrazine	326
	Hydrogen	369
Chlorine Trifluoride	Hydrazine	264
	Aerozine-50**	258
	Hydyne***	248
	RP-1****	232
	UDMH*****	252
95% Hydrogen Peroxide— 5% Water	Hydrazine	254
	Aerozine-50	251
	Hydyne	248
	UDMH	250
Red Fuming Nitric Acid (15% NO ₂)	Hydrazine	254
	Aerozine-50	251
	Hydyne	246
	UDMH	248
Nitrogen Tetroxide	Hydrazine	263
	Aerozine-50	259
	Hydyne	254
	UDMH	256

* Actual specific impulse is approximately 90% of theoretical or calculated Isp.

** Aerozine-50 is a mixture 50% by weight UDMH and 50% hydrazine.

*** Hydyne is a mixture 60% by weight UDMH and 40% diethylenetriamine.

**** RP-1 is a hydrocarbon fuel (kerosene) in accordance with USAF specifications.

***** UDMH is unsymmetrical dimethyl hydrazine (also called Dimazine).

Yet its very reactivity has been a serious handicap in its use. Fluorine is highly corrosive to the various alloys and steels used in fabricating rockets. It is also extremely toxic as is hydrofluoric acid—one of the major products of hydrogen/fluorine combustion.

It is gaseous at room temperature and liquefies at -306°F . Since fluorine is feasible for use as an

oxidizer only as a liquid, it must be treated as a cryogenic—extremely cold—material. Well known cryogenics such as liquid hydrogen and liquid oxygen are difficult enough to handle without having the added handicaps of toxicity and corrosiveness.

Why then bother with fluorine at all? High Isp is the answer. Because the fluorine/hydrogen sys-

tem gives the highest Isp of any chemical propellant combination, it is very delectable as far as rocket engineers are concerned. Delectable enough to fight the disadvantages of being toxic, corrosive, and cryogenic? That depends upon the application.

The next best Isp is offered by the non-hypergolic system of hydrogen and oxygen. While cryogenic, oxygen has the distinct advantages of being nontoxic and much less corrosive than fluorine. Thus, at first appearance, oxygen appears to be much the better oxidizer. It offers less impulse but also far fewer problems. But—the oxygen/hydrogen system is non-hypergolic.

Oxygen and hydrogen form an extremely explosive mixture. Anyone who has ever ignited a mixture of the two gases can verify that statement quite easily. Split-second ignition timing must be used in any rocket engine utilizing this system. Without it, hard starts occur with monotonous regularity. Because this timing is so difficult to obtain, reliable ignition has been one of the chief problems experienced with the system. In so far as the hydrogen/oxygen system is concerned then, non-hypergolic ignition is a considerable disadvantage.

High Isp and a sure-fire method of ignition in the hydrogen/fluorine system are distinct advantages which rate it over hydrogen and oxygen which seem to be the best

system currently available. However, by no stretch of the imagination can high toxicity and corrosiveness be rated as favorable characteristics of fluorine. This is true, but they are combatable.

The problem of fluorine corrosion has been largely surmounted by a process known as passivation. Chemists have long known that about the only thing fluorine is reluctant to attack is a fluoride—that is, a compound of fluorine. The more fluorine the compound contains, the more inert it becomes to the action of elemental fluorine. Passivation makes use of this fact by allowing a thin metal fluoride layer to protect the surface of any metal which comes into contact with gaseous or liquid fluorine. The part to be passified—an oxidizer line, for example—is first thoroughly washed with solvents to remove any organic material and dried with gaseous nitrogen. Gaseous fluorine is then passed slowly through the line and allowed to react with the metal surface. A metal fluoride film is formed which is inert to gaseous or liquid fluorine. A simple method for determining when passivation is completed is to place a cotton ball where the unreacted gas will exit. When the ball bursts into flame, the line is passified.

Because hydrogen/fluorine combustion produces toxic products, the areas where an engine utilizing this system can be used are severely limited. Obviously, anywhere near

a populated area is out of the picture. However, there is one place where it can be used. One place where toxicity is not a problem and where high Isp and hypergolicity become extremely important. It's not White Sands, or Vandenberg, or Canaveral. An engine produces more Isp at White Sands because of its higher altitude, but hydrofluoric acid is not appreciated there any more than any other place. No, the place I'm speaking of is outer space. Outer space is the one place where toxic exhaust products are not a problem. There, the hydrogen/fluorine system has its greatest potential and there is where it will undoubtedly be used.

A hydrogen/fluorine engine has been proposed as an upper stage for a combined European space effort. Such an engine has already been designed and static tested in this country. Even fluorine can be tamed; it depends on application.

Fluorine is admittedly an extreme case, but ten years ago it wasn't extreme—it was impossible. Other oxidizers today present less of a problem, but less promise also. Nitrogen tetroxide, on the other hand, is neither extreme nor does its use lie in the future.

The Titan II, our most powerful ICBM, is a two-stage rocket which uses nitrogen tetroxide and Aerozine-50—a fifty-fifty mixture of hydrazine and UDMH—in both first- and second-stage engines. One of the main reasons nitrogen tetroxide and Aerozine-50 were chosen for

Titan II is because they are classified as storable propellants; that is, they are non-cryogenic and do not decompose under proper storage conditions. The fact that they are hypergolic has proven advantageous in a number of ways. Use of hypergolic propellants has permitted great simplification in engine design and has decreased the amount of ground support equipment required. If the oxidizer and fuel are accidentally spilled, they simply burn and can be extinguished by conventional means; they cannot form an explosive mixture or detonate.

This last particular feature has resulted in a distinctly advantageous design change in the Gemini two-man spacecraft which is to be boosted in orbit by the Titan II. Gemini is a spacecraft intermediate in size between Apollo and Mercury. The seats in Gemini are designed to be ejected if quick escape is necessary. As a result, the large escape rocket which rode a tower atop the Mercury capsule will no longer be present on Gemini. Ejection seats rather than an escape tower are to be used in Gemini because the hypergolic storable propellants of the Titan II booster will not have the explosive yield of the liquid oxygen and kerosene used in the Mercury-Atlas booster. The ejection seats will be canted forward so that, in an ejection from the launch pad, enough altitude will be achieved to permit safe parachute deployment.

The fire hazards associated with accidental spillage of hypergolic propellants have long been considered one of the major drawbacks to their use. In the case of the Gemini-Titan II booster however, fire is considerably less dangerous than a violent explosion would be. As a consequence, what at first appeared to be a distinctly disadvantageous feature of the Titan II propellants has been put to special advantage in the design of Gemini.

Gemini, designed as an earth-orbiting spacecraft, presents a convenient transition point from large boosters to space probes. In space probes hypergolic ignition can play a vital role, since restartable engines are essential for both attitude and midcourse guidance corrections. This can best be illustrated by the lunar probe, Atlas-Able 5A. The third stage of this probe consisted of an STL engine which differed from previous engines in that it was an integral part of the payload. The engine was designed to provide multiple restarts in deep space. Thrust is provided by the decomposition of hydrazine as it passes over a heated catalyst bed. Smooth and complete decomposition of hydrazine occurs when the catalyst is heated above 700°F. The hypergolic reaction of nitrogen tetroxide with hydrazine is used to heat the catalyst bed sufficiently to cause catalytic decomposition of the hydrazine.

The sequence of engine firing is:

1. Normally closed fuel and ox-

idizer valves are opened by electric impulse from earth or missile guidance system.

2. Oxidizer—nitrogen tetroxide—is timed to enter the thrust chamber through impinging jets about 50 milliseconds ahead of the fuel—hydrazine.
3. Oxidizer flow continues for about 200 milliseconds emptying the start tank. The eight cubic centimeters of nitrogen tetroxide contained in the start tank are sufficient to heat the catalyst to the hydrazine decomposition point.
4. Catalytic decomposition of hydrazine begins and continues as long as the hydrazine valve is open.

The engine is stopped by an electrical impulse which closes the hydrazine valve. The engine is capable of as many as twenty-four restarts and can be fired after months in space. While nitrogen tetroxide and hydrazine form a feasible propellant combination in themselves, nitrogen tetroxide was used in this case only as a means of initiating a sequence whereby hydrazine could be used as a monopropellant.

Titan II and the STL lunar probe engine are examples of the wide spectrum of uses to which hypergolic ignition has been put. The extent of this spectrum can be seen in Table II which is a compilation of rocket engines making use of hypergolic propellants or hypergolic ignition. It might be asked,

TABLE II
LIQUID PROPELLANT ROCKET SYSTEMS USING
STORABLE PROPELLANTS¹

<i>Space Vehicles</i>	<i>Engine Manufacture</i>	<i>Propellants</i>	<i>Payloads</i>
Able Series ²	Aerojet-General	IWFNA/UDMH	Various ballistic re-entry vehicles: Tiros I—1 April 1960 Explorer VI—7 August 1959 Pioneer V—11 March 1960 Pioneer I—11 October 1958
AbleStar ²	Aerojet-General	IRFNA/UDMH	First rocket engine restart in space: Transit IB—13 April 1960 Transit 2A GREB I—22 June 1960 Courier IB—4 October 1960 Transit 3B—21 February 1961 LOFTI Transit 4A GREB—28 June 1961 INJUN Transit 4B—15 November 1961 FRAAC
Delta	Aerojet-General	IWFNA/UDMH IRFNA/UDMH	Echo I—12 August 1960 Tiros II—23 November 1960 Tiros III—12 July 1961 Explorer X—25 March 1961 Explorer XII—15 August 1961 OSO—7 March 1962 Tiros IV—8 February 1962
Vanguard ³	Aerojet-General	IWFNA/UDMH	Vanguard I—17 March 1958 Vanguard II—17 February 1959 Vanguard III—8 September 1959
Atlas-Able ³ Payload Vernier	Space Technology Laboratories	Hydrazine (N ₂ O ₄ Igniter)	First monopropellant rocket engine started in space—25 September 1960
Agna A XLR81-BA-3	Bell	IRFNA/UDMH	Discoverer I—28 February 1959
Agna B XLR81-BA-5	Bell	IRFNA/UDMH	Discoverer II—13 April 1959 Discoverer V—13 August 1959 Discoverer VI—19 August 1959 Discoverer VII—7 Nov 1959 Discoverer VIII—20 Nov 1959

¹ Prepared by Aerojet-General Corporation

² Second-stage system

³ Lunar probe vernier system

<i>Space Vehicles</i>	<i>Engine Manufacturer</i>	<i>Propellants</i>	<i>Payloads</i>
Agena B XLR81-BA-5 continued			Discover XI—15 April 1960 Midas II—24 May 1960 Discoverer XIII—10 Aug 1960 (first recovery of orbited capsule) Discoverer XIV—18 Aug 1960 Samos II—31 January 1960
Agena B XLR81-BA-7	Bell	IRFNA/UDMH	Discoverer XVII—12 Nov 1960 (first Agena restart in space) Discoverer XVIII—7 Dec 1960 Discoverer XIX—20 Dec 1960 Discoverer XX—17 Feb 1961 Discoverer XXI—18 Feb 1961 Discoverer XXIII—8 Apr 1961 Discoverer XXV—16 June 1961 Discoverer XXVI—7 July 1961 Midas III—12 July 1961 Ranger I-A—23 August 1961 Discoverer XXIX—30 Aug 1961 Discoverer XXX—9 Sept 1961 Discoverer XXXI—17 Sept 1961 Discoverer XXXII—13 Oct 1961 Midas IV—21 October 1961 Discoverer XXXIV—5 Nov 1961 Discoverer XXXV—15 Nov 1961 Ranger II—18 Nov 1961 Samos—22 November 1961 Discoverer XXXVI—12 Dec 1961 Ranger III—26 January 1962 Discoverer XXXVIII—March 1962

<i>High Altitude Sounding Rockets</i>	<i>Engine Manufacturer</i>	<i>Propellants</i>	<i>Payloads</i>
Aerobee-100	Aerojet-General	IRFNA/UDMH	Research
Aerobee-150	Aerojet-General	IRFNA/ANFA ⁴	Research
Aerobee-300	Aerojet-General	IRFNA/ANFA	Research
Wac-Corporal	Aerojet-General	RFNA/Aniline	Research
Bumper-Wac	Jet Propulsion Laboratory	RFNA/ANFA	First U.S. liquid two-stage launch. Reached 250-mile altitude 24 Feb- ruary 1949.

⁴ Red fuming nitric acid/65% aniline/35% furfural alcohol

<i>Military Missiles</i>	<i>Engine Manufacturer</i>	<i>Propellants</i>	<i>Payloads</i>
Nike-Ajax ⁵	Aerojet-General and Bell	RFNA/JP-4	Warhead
Corporal	Jet Propulsion Laboratory and Firestone	RFNA/Monoethylaniline	Warhead
Rascal XLR81-BA-1	Bell	RFNA/JP-4	Warhead
LAR ⁵	U.S. Naval Ordnance Test Station	IRFNA/UDMH	Warhead (first truly storable U.S. rocket)
NALAR ⁵	Rocketdyne	IRFNA/Turpentine	Warhead
Sparrow ⁵	Reaction Motors Division/Thiokol	IRFNA/MAF ⁶	Warhead
Bullpup A ⁵	Reaction Motors Division/Thiokol	IRFNA/MAF	Warhead
Bomarc A ⁵ LR59 ² AJ-13	Aerojet-General	IRFNA/JP-X	Warhead
XLR64-NA-2 ⁵	Rocketdyne	IRFNA/Hydyne	Beech Aircraft Target Drone XKD-2B-1
Titan II ⁵ XLR87-AJ-5 and XLR-AJ-5	Aerojet-General	N ₂ O ₄ /Aerozine-50	First two-stage storable missile. Can carry either manned vehicle, Dyna Soar and Gemini, or warhead

<i>Test Vehicles</i>	<i>Engine Manufacturer</i>	<i>Propellants</i>	<i>Payloads</i>
GORGON 2A GORGON 3A GORGON 3C	U.S. Naval Engineering Experiment Station	Mixed nitric and Sulfuric acids/ Monoethylaniline	Research
Lark XLR-RM-2 LR2-RM-6	Reaction Motors Division/Thiokol	RFNA/Monoethyl- aniline	Research
GAPA	Aerojet-General	RFNA/ANFA	Research
NATIV	Aerojet-General	RFNA/ANFA	Research
Shrike	Aerojet-General	RFNA/ANFA	Research

⁵ Storable rocket—can be stored for long periods with propellant aboard

⁶ mixed amine fuel

why make the distinction? The answer here is that many rocket engines using anergolic—non-hypergolic—propellants rely upon a hypergolic reaction to initiate combustion of the anergoles.

This is accomplished by the use of so-called hypergolic "slugs." Hypergolic slugs may be either fuels or oxidizers. If, for example, the slug is a fuel, it is sealed in the fuel line upstream of the combustion chamber fuel injectors. Through burst diaphragms the regular fuel forces the hypergole into the combustion chamber where ignition occurs immediately upon contact with the oxidizer. This hypergolic reaction in turn ignites the regular fuel following behind the hypergole. Obviously the hypergole and the regular fuel must be compatible for this sequence to be effective. Slugs used in this manner are one-shot affairs; therefore, multiple starts are impossible.

Certain metal alkyl compounds are known as pyrophores; that is, they spontaneously ignite upon contact with air. Since the compounds obviously react with the oxygen in the air, they have been extensively investigated as possible starting materials in rockets using oxygen as the oxidizer. While it might seem that any pyrophore would serve as a hypergolic slug, this is not so. To be used as slugs, the pyrophores must be liquid and must be sufficiently reactive to ignite spontaneously at the temperature of liquid oxygen—approx-

mately — 300°F. Three metal alkyls which have been used for this purpose are triethyl aluminum, triethyl boron, and trimethyl aluminum.

Perhaps the best known of the rockets which use hypergolic slugs for ignition is the Atlas. Since as an ICBM the Atlas follows a ballistic trajectory, there is no need for a restart capability. For space applications, the Atlas is used as a main stage and again no restart capability is necessary.

Saturn—which is to be the United States space workhorse for the next decade—has several main stage configurations. The initial configuration, which has been successfully test fired at Cape Canaveral, is a cluster of eight H-1 engines. The H-1 engine uses a hypergolic slug for ignition. A later main stage configuration will consist of four F-1 engines. The F-1 also is started by means of a hypergolic slug.

In closing this article, mention must be made of the strange breed of rocket called hybrid. A hybrid rocket generally makes use of a liquid oxidizer and a solid fuel, although the reverse can be true. The hybrid rocket is particularly suitable for hypergolic ignition because it provides an extensive solid surface on which the hypergolic reaction can occur. However, solid fuels are usually considerably less reactive than liquid fuels. As a consequence, only a few oxidizers, notably fluorine and chlorine trifluoride, have been found to be

hypergolic with solid fuels. When used with those solid propellants which contain only a low percentage or no solid oxidizer, fluorine or chlorine trifluoride give restart capability to a hybrid rocket, since combustion automatically ceases when they are shut off.

In recent Air Force studies, chlorine trifluoride has been used as a starting fluid for large solid propellant engines. The chlorine trifluoride gave smooth consistent

starts which compared favorably with the best pyrotechnic ignition. This forces an alteration to an earlier statement in this article. Pyrotechnic ignition devices are now used in most, *not all*, solid propellant rockets.

One thing can be stated with a fair amount of certainty however. Until something better comes along, your car engine will have to rely for ignition on the external power source called a battery. ■



Moon Crawler

Currently, plans call for landing an instrumented probe on the Moon first, to gather what data it can and send it back by telemetry—which return trip is very much cheaper and easier than “bringing ‘em back alive.” It’s much easier to boost a few billion quanta of RF or light energy from the surface of Luna to Earth than to boost even the smallest microfilm capsule.

However, though a single Lunar probe, landed successfully in one spot would give us infinitely more information than we now have about the conditions there, a mobile observer would be enormously more valuable.

Whether it be merely an instrumented Moon Crawler or a man-carrying later development—the Moon Crawler must be designed, built, and tested.

How do you build a mobile vehicle to operate on an unknown type of surface, with unknown texture, and unknown degrees of faulting, splitting, and dust depth and/or density? What *is* a planetary surface like when there has been *no* weathering whatever?

So . . . among the best guesses on how-to-do-it is this type of very-low-center-of-gravity, very wide-tread, gas-bag type rollers. The rollers would probably be foam elastomer, rather than inflated “tires,” with the individual foam cells not interconnected.

If the foam has been formulated “badly,” with a “lumps in the mashed potatoes” effect, having distributed nuggets of dense, tough solid elastomer, the wearing qualities ought to be very good indeed, while the resultant rollers could grip on dust, sand, bare rock, or volcanic glassy material.

A Life For The Stars

Second of Two Parts.

Knowledge—pure data—can be used for good or ill. But ignorance, the lack of knowledge, almost invariably leads to ill.

The City Fathers were somewhat inhuman—but most decidedly wise!

by James Blish

Illustrated by Schoenherr

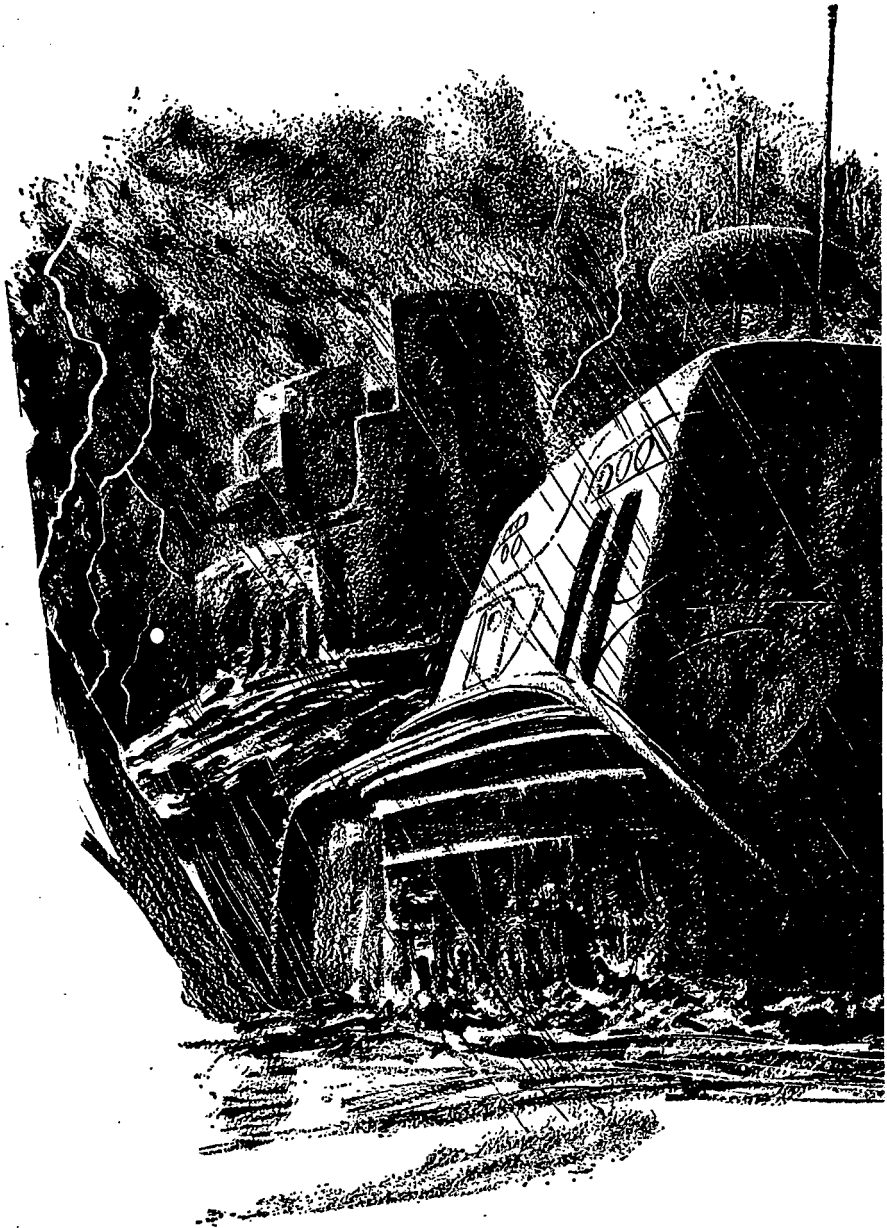
SYNOPSIS

CRISPIN DeFORD, youngest son of a destitute backwoods Pennsylvania family in the pastoral Thirty-second Century, could not miss the chance to watch the excitement attending the take-off of Scranton, a city just beginning a life of hobo space-cruising. The town was far from the first to do so; the virtual exhaustion of Earth's natural resources, plus the setting in of a relatively mild but seemingly stable world-wide despotism, had driven many cities into space, leaving the rest of the planet sinking deeper and deeper into the Permanent Depression.

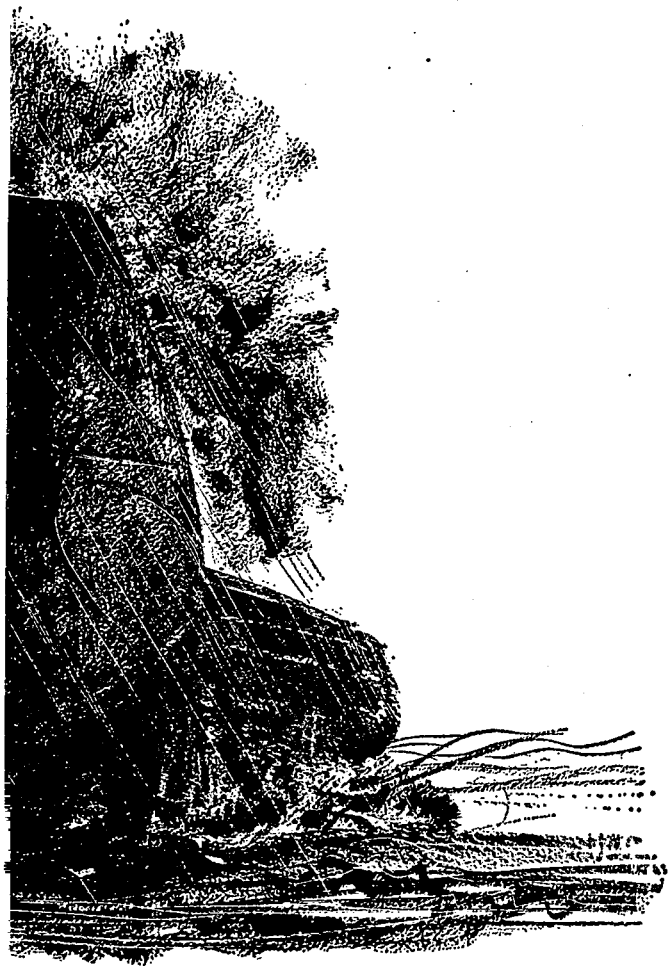
Chris did not, however, expect to become a part of the spectacle. Strictly in accordance with law, he was impressed into Scranton's crew upon straying too close to the take-off area.

Aboard the flying city, he was befriended by FRADLEY O. HASKINS, a tough but scrupulously fair lieutenant of Scranton's amoral and highly dangerous city manager, FRANK LUTZ. He was temporarily apprenticed to the city's astronomer, but really had no skills that were useful to the infant Okie city; hence Lutz finally included him as an article of trade in a swap with New York, a city which had already been in space for several centuries, with the near-legendary JOHN AMALFI at the helm.

Getting wind of the deal, Chris hid; but Frad Haskins ferreted him out and persuaded him to make the transfer. Aboard New York, Chris was met by the perimeter sergeant, JOEL ANDERSON, who together with his wife



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CARLA was to be his guardian. He was then turned over to the CITY FATHERS, an articulate collection of computers which appeared to be in charge of most of the operations of the city. From them he learned for the first time the major prize of Okie citizenship: an indefinitely prolonged life—if he can earn it by the age of eighteen.

He believed his opportunity had struck when Anderson announced the city's first planetfall since Chris had come aboard.

VI

Nothing could be seen of Heaven from the air. As the city descended cautiously, the spindizzy field became completely outlined as a bubble of boiling black clouds, glaring with blue-green sheets and slashes of lightning, and awash with streams of sleet and rain. At lower altitude the sleet disappeared, but the rain increased.

After so many months of starlit skies and passing suns, the grumbling, closed-in darkness was oppressive, even alarming. Sitting with Piggy on an old pier at the foot of Gansevoort Street, from which Herman Melville had sailed into the distant South-Sea marvels of *Typee*, *Omoo* and *Mardi*, Chris stared at the globe of thunder around the city as nervously as though he had never seen weather before. Piggy, for once, was in no better shape, for he never *had* seen weather before; this was New York's first planetfall since he had been born.

How Amalfi could see where he was going was hard to imagine; but the city continued to go down anyhow; it had a contract with Heaven, and work was work. Besides, there would have been no point in waiting for the storms to clear away. It was always and everywhere like this on Heaven, except when it was worse. The settlers said so.

"Wow!" Chris said, for the twelfth or thirteenth time. "What a blitzkrieg of a storm! Look at *that*! How far up are we still, Piggy?"

"How should I know?"

"D'you think Amalfi knows?"

"Sure, he knows," Piggy said miserably. "He always does the tough landings. He never misses."

WHAM!

For a second the whole sphere of the spindizzy field seemed to be crawling with electric fire. The noise was enormous, and bounded back again and again from the concrete sides of the towers behind them. It had never occurred to Chris that a field which could protect a whole city from the hard radiation, the hard stones and the hard vacuum of space might pass noise when there was air outside it as well as inside—but it surely did. The descent already seemed to have been going on forever.

After a while, Chris found that he was enjoying it. Between thunder-rolls, he shouted maliciously:

"He must be flying sidewise this time. Bet he's lost."

"What do you know about it?"

"I've seen thunderstorms. You know what? We're going to be up here forever. Sailing under a curse, like IMT." The sky lit. *WHAM!* "Hey, what a beauty!"

"If you don't shut up," Piggy said with desperate grimness, "I'm going to poke you."

This was hardly a very grave threat, for although Piggy outweighed Chris by some twenty pounds, most of it was blubber. Amid the excitement of the storm Chris almost made the mistake of laughing at him; but at the same instant, he felt the boards of the ancient pier begin to shudder beneath them to the tramp of steel boots. Startled, he looked back over his shoulder and jumped up.

Twenty men in full space armor were behind them, faceless and bristling, like a phalanx of giant robots. One of them came forward, making the planks of the pier groan and squeal under the weight, and suddenly spoke to him.

The voice was blarey and metallic, as though the gain had been turned up in order to shout across acres of ground and through cannonades of thunder, but Chris had no difficulty in recognizing it. The man in the armor was his guardian.

"CHRIS!" The volume of sound suddenly went down a little. "Chris, what are you doing here? And Kingston-Throop's kid! Piggy, you ought to know better than this. We're landing in twenty minutes—and this is a sally-port. Beat it—both of you."

"We were only looking," Piggy said defiantly. "We can look."

"I've got no time to argue. Are you going or not?"

"Come on, Piggy. What's the sense of being in the way?"

"Let go. I'm not in the way. They can walk right by me. I don't have to go just because he says so. He's not *my* guardian—he's only a cop."

A steel arm reached out, and steel pincers opened at the end of it. "Give me your card," Anderson's voice said harshly. "I'll let you know later what you're charged with. If you won't move now, I'll assign two men to move you—though I can't spare the men, and when that winds up on your card you may spend the rest of one lifetime wishing it hadn't."

"Oh, all right. Don't throw your weight around. I'm going."

The bulbous steel arm remained stiffly extended, the pincers menacingly open. "I want the card."

"I said I was going!"

"Then go."

Piggy broke and ran. After a puzzled look at the armored figure of his guardian, Chris followed, dodging around and through the massive blue-steel statues standing impassively along almost the whole length of the pier.

Piggy had already vanished. As Chris ran for home, his mind full of bewilderment, the city grounded in a fanfare of lightning-bolts.

Unfortunately, so far as Chris

was concerned the City Fathers took no notice of the landing: his schooling went on regardless, so that he got only the most confused of pictures of what was going on. Though the municipal pipeline, WNYC, had five-minute news bulletins on tap every hour for anyone who wanted to dial into them, decades of the uneventfulness of interstellar travel had reduced the WNYC news bureau to a state of vestigial ineptitude—the pipeline's only remaining real function was the broadcasting of the city's inexhaustible library of music and drama; Chris suspected that most of the citizens found the newscasts almost as dim-witted and uninformative as he did. What little meaningful information he was able to garner, he got from Sergeant Anderson, and that was not very much, for the perimeter sergeant was hardly ever home now; he was too busy consolidating the beach-head on Heaven. Nevertheless, Chris picked up a few fragments, mostly from conversations between the sergeant and Carla:

"What they want us to do is to help them industrialize the planet. It sounds easy, but the kicker is that their social setup is feudal—the sixty-six thousand people they call the Elect are actually only free landholders or franklins, and below *them* there's a huge number of serfs, nobody's ever bothered to count them. The Archangels want it to stay that way even after they've got their heavy industries established."

"It sounds impossible," Carla said.

"It is impossible, as they'll find out when we've finished the job. But that's exactly the trouble. We're not allowed to change planets' social systems, but we can't complete this contract without starting a revolution—a long, slow one, sure, but a revolution all the same. And when the cops come here afterward and find that out, we'll have a Violation to answer for."

Carla laughed musically. "The cops! My dear, is that still a three-letter word for you? What else are you? How many more centuries is it going to take you to get used to it?"

"You know what I mean," Anderson said, frowning. "So all right, I'm a cop. But I'm not an Earth cop, I'm a *city* cop, and that makes all the difference. Well, we'll see. What's for lunch? I've got to go in half an hour."

The storm, as predicted, went on all the time. When he had the chance, Chris watched the machinery being uncrated and readied, and followed it to the docks at the working perimeter of the city, beyond which always bobbed and crawled a swarm of the glowing swamp vehicles of the colonists of Heaven. Though these came in all sizes, they were all essentially of the same design: a fat cylinder of some transparent cladding, ribbed with metal, provided on both sides with caterpillar treads bearing

cleats so large that they could also serve as paddles where the going underfoot became especially sloppy. The shell was airtight, for buoyancy, but Chris was sure that the vessel could make little or no headway afloat, even if it were equipped somewhere with a screw propeller; under those circumstances it probably could do no more than try to maintain its position as best it could while it radioed for help. It was well studded with antennae. It seemed to be designed to shed water, rather than to swim in it.

How could any sort of industry be possible under these soggy conditions? He could not imagine how even an agricultural society could survive amidst these perpetual torrents, especially since there was very little land area above water on the planet. But then he recalled a little of the history of the colonization of Venus, which had presented somewhat similar problems. There, farming eventually had been taken beneath the sea; but even that needed an abundance of energy, and besides, the people of Heaven hadn't even gotten that far—they seemed to be living mostly on fish and mudweed.

He listened as closely as possible to the conversations of the colonists on the docks—not the conversations in English with the Okies, which were technical and unrevealing, but what the colonists said to each other in their own language. This was a gluey variant of Russian, the now dead Universal Language

of deep space, which the memory cells had been cramming into Chris' head at a cruel rate almost since the beginning of his city education. It was a brute of a language to master, especially on board a town where it was very seldom used, and perhaps for this reason the colonists, though mostly they were circumspect even in their private conversations, did not really seem to believe that the Okies spoke it; their very possession of it assured them that their history was safely pre-Okie. Quite certainly it never occurred to them that it might be understood, however imperfectly, by a teen-age boy standing about the quai-sides gawping at their power-boats.

Between these eavesdroppings and the increasingly rare visits home of his guardian, Chris gradually built up a fuzzy picture of what the colonists seemed to want. As a citizen, he could have asked the City Fathers directly for the text of the contract, but access to this was denied to passengers. In general, however, he gathered that the Archangels proposed to establish an economy like that of Venus, complete with undersea farming and herding, with the aid of broadcast power of the kind that kept the city's Tin Cabs in the air. The Okies were to do the excavating in the shifting, soaking terrain, and were to build the generator-transmitter station involved. They were also to use city facilities to refine the necessary power metals, chiefly thorium, of which Heaven had an

abundance beyond its ability to process. After the economy was revamped, the Archangels hoped to have their own refineries, and to sell the pure stuffs to other planets. Curiously, they also had enough germanium to be willing to pay for the job in this metal, although it, too, was notoriously difficult to refine; this was fortunate for them, since without any present interstellar trade, they were woefully short of Oc Dollars.

Once the whole operation had rumbled and sloshed out into the field and was swallowed up in the enveloping, eternal storm, Sergeant Anderson's absences became prolonged, and the number of colonists to be found on the docks also diminished sharply. Now there were only a few of the swamp vehicles—inexplicably called swanboats—to be seen at the end of each day, when Chris was released from school, and these were mostly small craft whose owners were engaged in dickering with individual Okies for off-planet curios to give to their ladies. This commerce also was bogging down rather rapidly, for the single citizen had no use for money, and the lords and franklins of Heaven had few goods to barter. Soon the flow of information available to Chris had almost stopped, frustrating him intensely.

In this extremity he had an inspiration. He still carried with him a small, cheap clasp-knife with a tiny compass embedded in its handle, the last of the exceedingly few

gifts his father had ever been able to give him; perhaps it would have status here as an off-planet curio. When the notion first occurred to him, he rejected it with distress at even having thought of it—but when first Sergeant Dulány, and then his own guardian, were officially posted on the "Missing" list, he hesitated no longer. His only remaining doubt was whether or not the compass would work here, amid so much electrical activity—but then it had never worked very well on Earth, either.

He waited until he saw the lord of a six-man swan boat stalking disappointedly away from a deal he had been unable to close, and then approached him with the knife outstretched on his palm.

"Gospodin—"

The man a huge burly fellow with a face like one of the eternal thunderclouds of his planet, stopped in his tracks and looked down. "Boy? Did you speak?"

"Yes sir. With your permission, I have here useful tool, Earthly in origin. Would my lord care to examine?"

"But you speak our language," the man said, still frowning. He took the knife abstractedly; it was plain that he was interested, but Chris' stumbling Russian seemed to interest him more. "How is that?"

"By listening, lord. It is very hard, but I am trying. Please see object, it is from Earth, from *kolk-*

box of Pennsylvania. Genuine antique, touched once by human hands in factory."

"How does it work?"

Chris showed him how to pry out the two blades, but his attempts to explain the compass were dismissed with a brusque gesture. Either his command of the language was insufficient to make the matter clear, or the lord already had recognized that such a thing would be useless in the lightning-stitched ether of Heaven.

"Hm-m-m. Sleazy, to be sure, but perhaps my lady would like it for her charm-necklace. What do you ask for it?"

"Lord, I would like to drive your swan boat one time, one distance. I ask no more."

The colonist stared at him for a long moment, and then burst into deep guffaws of laughter. "Come along, come along," he said when he had recovered a little. "Sharp traders, you tramps, but this is the best story yet—I'll be telling it for years! Come along—you have a bargain."

Still chortling, he led the way to the dock, where they were both stopped by a perimeter cop who recognized Chris. Between them, the boy and the lord explained the bargain, and the Okie guard dubiously allowed Chris to board the swan-boat.

In the forward cabin of the bobbing cylinder, two other colonists confronted them at once, wearing expressions at once nervous and

angry, but the owner shushed them with a swift slash of one hand. He still seemed to be highly amused.

"It's only an infant. It traded me a bangle to learn how to mush the boat about. There's nothing to that. Go on aft; I'll join you in a minute."

To judge by their expressions, the other two still disapproved, but they took orders. The big man sat Chris down in a bucket seat before the broad front window and showed him how to grasp the two handles, one on each side of the half-circle of the control wheel, which were the throttles of the vehicle.

"It's not enough simply to turn the wheel, because you must also deliver power to one tread or the other. To do that, you push the handle forward or back, to speed the treads or slow them down. Past the red mark here, the tread will reverse. If you're not getting any traction; tilt the whole wheel forward on its column; that blows the tanks and allows the boat to settle in the mud. When the ground gets harder, the boat will of course climb up by itself and that will start the pumps; as the pressure in the tanks rises, the steering column tilts back to its original position automatically. Understand me so far?"

"But can I try?"

"Well, I suppose so. Yes. I have some talking to do abaft. Let me back the craft away from the pier, and then you can try crawling in a circle just outside the perimeter.

Make sure you can always see your city beacon there."

"Let me back it up, lord?" Chris said urgently.

"All right," the big man said with amused indulgence. "But don't be rough with it. Gently back of the red line on both throttles. That's it. Not so fast. Gently! Now into neutral on the left. That's it; see how it turns around?"

There was a shout from somewhere in the rear of the vessel, to which the big man responded with a tremendously rapid burst of speech; only a few words of which were intelligible to Chris. "I have to leave for a few minutes," he added. "Remember, don't try anything tricky, and don't lose sight of the beacon."

"No, lord."

As the boat's owner left the cabin, Chris caught a few more words, amusedly beginning to relate the story of the dock-boy who had picked up a few stammering words of the language and immediately had decided that he was a pilot; then the voices dwindled to a blurred murmur. Chris spent the next few minutes testing the controls of the boat in small jerks and spurts, being as inexpert about it as he could manage, although the machine was really not difficult to master. Then, as directed, he set it to crawling in a fixed circle, counterclockwise, left the bucket-seat, and edged his way back to the door leading to the next chamber.

He had no idea what it was that he expected to overhear—he was simply avid for more information, to relieve the recent famine. He was unprepared for what he got.

The men were talking in a rapid patois which differed sharply from the form of the Universal Language which the memory cells had been teaching him, but many phrases were clear and distinct:

"... Can't be done without keeping the city, that's all there is to it."

"... Disable it? ... Don't even have a blueprint of the machinery, let alone a map."

"That can come later, after we've occupied ... We've got thousands of commoners to throw away, but the defenses ... it's essential first to immobilize their HUACU, or whatever they call it here. We can't afford to fight on their terms."

"Then what's the problem? We've got their two chief generals for hostages. We can hold them forever if necessary ... don't even know the name of Castle Wolfwhip, let alone where it—"

There the conversation ended abruptly. With a grinding thump, the swan boat hit something and began clumsily to try to climb it. Chris was thrown to the deck, and on the other side of the doorway there was the sound of scrambling and of angry shouting. Then that, too, was cut off as the bulkhead swung to of its own inertia.

Fighting to regain his balance against the blind lurching of the

boat, Chris scrambled up, and dogged the bulkhead tightly closed all the way around. Was there any way to lock it, too? Yes, there was a big bolt that could be thrown which would hold the whole series of dogs in place, provided that it could not be unbolted from the other side. Well, he'd have to take his chances on that, though a fat padlock to complete the job would have made him feel more comfortable. Then, he clambered up the tilted, pitching deck to the control seat.

The boat had been doing its best to travel in a circle, but Chris had failed to realize that mud is a shifting, inexact sort of medium in which to turn a machine loose. The circle had been precessing, and the boat had run head-on into a dock. Okie cops were running toward it.

Chris reversed both engines, backing away from the city as rapidly as the boat would go, but that was not half as fast as he would have liked. Then he switched the vehicle around, end for end and set it to whining and sliding squarely into the teeth of the storm, aiming it for the pip on the cross-hairs which showed on the control board as its homing signal.

Where that might wind him up, he had no idea. He could only hope that it might be Castle Wolfwhip, and that he would find Anderson and Dulany there—and that the six furious colonists in back of the locked bulkhead would not be able

to burn their way out before he got there.

VII

Before the swan boat had been on its slobbering way outward for more than five minutes, the sodium-yellow glare of the city's dockside beacon dimmed and vanished as swiftly as if it had been snuffed out. Except for his prisoners, whom he was trying to ignore, Chris was alone in the shell of the boat, like a chick in an egg, with nothing for company but the unfamiliar instruments, the grunting of the engines, and the flash and crash of the eternal storm.

He studied the control board intently but it told him very little that he did not already know. All the lettering on and around the instruments was in the Cyrillic alphabet—and although the City Fathers expected citizens to be able to speak the Universal Language, up to now they had given Chris not even a first lesson in how to read it. Even so obvious a device as the swanboat's radio set was incomprehensible to him in detail; after a brief study, he gave up all hope of finding the city's master frequency and calling for pursuit and aid. He could not even decide whether it was an FM or a PM tuner, let alone read the calibrations on the dial.

Nevertheless he urgently needed to signal. Above all, he needed to let the city know the details, fragmentary though they were, of the

plotting that he had overheard. Running away with the plotters in their own swan boat had been an impulse of desperation, which he was already beginning more and more to regret. If only he had managed somehow to get back on shore, and told somebody in Amalfi's office what he had learned, pronto—!

But the question was, would they have listened, or believed him if they had? Nobody who was anybody aboard the city seemed to want to bother with youngsters until they had become citizens; the adults were all too old, somehow, to be even approachable—and for that matter citizens paid very little attention to passengers of any age.

Of course, Chris could have told the City Fathers what he knew, easily enough—but everything that was told the City Fathers went into the memory cells, which was the equivalent of putting it in dead storage. The City Fathers never took action on what they knew, or even volunteered information, unless directed; otherwise they only held it until it was asked for, which might take centuries.

In any event the die was cast. Now he also needed someone in the city to know where he was going, and to follow him. But among the glittering, enigmatic instruments before him he could find no way to bring that about, nor did he in fact know even vaguely how the city might chase after him if it did know what his situation was. The Tin Cabs operated upon broadcast

power which faded out at the city's perimeter, and to the best of Chris' knowledge, the city had no ground vehicles capable of coping with shifting, ambiguous, invisible terrain of this kind. Somewhere in storage, true, it did have a limited number of larger military aircraft, but how could you fly it in this region of perpetual storm? And even if you could, what would you look for, in a world where even the largest villages and castles produced and consumed so little power that detecting instruments would be unable to differentiate a city from a random splatter of lightning bolts?

The swan boat churned onward single-mindedly. After a while, Chris noticed that it had been at least several minutes since he had had to apply corrections in order to keep the green pip on the crosshairs. Experimentally, he let go of the controls entirely. The pip stayed centered. Some signal—perhaps simply his keeping the pip centered for a given length of time—had cut in an automatic pilot.

That was a help, in a way, but it deprived him of anything to do but worry, and added a new worry to the list: How could he cut the autopilot *out* of the circuit if he needed to? The pertinent switch was doubtless in plain sight and clearly marked, but again, he couldn't read the markings. As for his prisoners, they were being disturbingly quiet. In the back of his mind he had been anticipating some attempt to burn through the door—surely they had



some sort of hand weapon back there which might serve the purpose—but they hadn't so much as pounded on it.

He hoped fervently that they were just being fatalistic about their captivity. If their silence meant that they were satisfied with it, that was bad news. The news was bad enough already, for he had no idea what he was going to do with them, or with the boat, when he got to Castle Wolfwhip—

And no time left to invent any plan, for in the next flash of lightning he saw the castle.

It was still several miles away, but even at this distance its massiveness was awe-inspiring. There were many towers in the city that were smaller; despite the lack of any adjacent structure with which to compare it, Chris guessed that the black, windowless pile could not be less than thirty stories high.

At first, he thought it was surrounded by a moat, but that was only an effect of foreshortening brought on by distance. Actually, it stood in the middle of a huge lake, so storm-lashed that Chris could not imagine how the clumsy swan boat could survive on it, let alone make any headway.

He pulled back on the throttles; but as he had suspected, the boat no longer answered to the manual controls. It plowed doggedly forward into the water. A moment later, the compressed air tanks blew with a bubbling roar, and the lake closed over the boat completely. It

was now traveling on the bottom.

Now he no longer had even the lightning-flashes to see by—nothing but the lights inside the boat, which did not penetrate the murky water at all. It was as though the transparent shell had abruptly gone opaque.

After what seemed a long while—though it was probably no more than ten minutes—the treads made a grinding noise, as if they had struck stone, and the vehicle came gradually to a halt. On a hunch, Chris tried the manuals again, but there was still no response.

Then the outside lights came on.

The swan boat was sitting snugly in a berth within a sizable cavern. Through the rills of yellow water draining down its sides, Chris saw that it had a reception committee: Four men, with rifles. They looked down into the boat at him, grinning unpleasantly. While he stared helplessly back, the engines quit—

—And the outside door swung open.

They put him in the same cell with Anderson and Dulany. His guardian was appalled to see him—“Gods of all stars, Irish, now they’re snatching children!”—and then, after he had heard the story, thoroughly disgusted. Dulany, as usual, said very little, but he did not look exactly pleased.

“There’s probably a standard recognition signal you should have sent, except that you wouldn’t have known what it was,” Anderson

said. “These petty barons did a lot of fighting among themselves before we got here—fleecing us is probably the first project they’ve been together on since this mudball was colonized.”

“Bluster,” Dulany commented.

“Yes, it’s part of the feudal mores. Chris, those men in the boat are going to take a lot of ribbing from their peers, regardless of the fact that they were never in any danger and they had sense enough to let you spin your own noose. They’ll be likely to take it out on you when you’re questioned.”

“I’ve already been interviewed,” Chris said grimly. “And they did.”

“You have? Murder! There goes that one up the flue, Irish.”

“Complication,” Dulany agreed.

Anderson fell silent, leaving Chris to wonder what they had been talking about. Evidently they had been planning something which his news had torpedoed—though it was hard to imagine even the beginnings of such a plan, for their captors, out of a respect for the two Okies which Chris knew to be more than justified, had left them nothing but their underwear. At last the boy said hesitantly:

“What could I have done if my interview were still coming up?”

“Located our spacesuits,” Anderson said gloomily. “Not that they’d have let you search the place, that’s for sure, but you might have gotten a hint, or tricked them into dropping one. Even wary men sometimes underestimate young-

sters. Now we'll just have to think of something else."

"There are dozens of spacesuits standing around the wall of that big audience chamber," Chris said. "If you could only get there, maybe one of them would fit one of you."

Dulany only smiled slightly. Anderson said: "Those aren't suits, Chris; they're armor—plate armor. Useless here, but they have some kind of heraldic significance; I think the barons used to collect them from each other, like scalps."

"That may be," Chris said stubbornly, "but there were at least two real suits there. I'm sure of that."

The two sergeants looked at each other. "Is it possible—?" Anderson said. "They've got the bravado for it, all right."

"Could be."

"By Sirius, there's a bluff we've got to call! Get busy on that lock, Irish!"

"In my underwear? Nix."

"What difference does that . . . oh, I see." Anderson grimaced impatiently. "We'll have to wait for lights out. Happily it won't be long."

"How are you going to bust the lock, Sergeant Dulany?" Chris asked. "It's as big as my head!"

"Those are the easy kind," Dulany said loquaciously.

Chris in fact never did find out what Dulany did with the lock, for the operation was performed in the dark. Standing as instructed all the way to the back of the cell, he did

not even hear anything until the huge, heavy door was thrown back with a thunderous crash.

The crash neatly drowned out the only yell the guard outside managed to get off. In this thunder-ridden fortress, nobody would think anything of such a noise. Then there was a jangle of keys, and two loud clicks as the unfortunate man was manacled with his own handcuffs. The Okies rolled him into the cell.

"What'll I do if he comes to?" Chris whispered hoarsely.

"Won't for hours," Dulany's voice said. "Shut the door. We'll be back."

From the boarding squad sergeant, nine words all in one speech had the reassuring force of an oration. Chris grinned and shut the door.

Nothing seemed to happen thereafter for hours, except that the thunder got louder. That was certainly no novelty on Heaven . . . but was it possible for even the heaviest thunder-clap to shake a pile of stone as squat and massive as Castle Wolfwhip? Surely it couldn't last long if that were the case—and yet it was obviously at least a century old, probably more.

The fourth such blast answered his question. It was an explosion, and it was *inside* the building. In response, all the lights came on; and Chris saw that the door had been jarred open.

When he went over to close it again, he found himself looking

down a small precipice. The corridor floor had collapsed. Several stunned figures were sitting amid the rubble it had made on the story below it. Considering the size of the blocks of which it had been made, they were lucky that it hadn't killed them.

Still another explosion, and this time the lights went back out. Quite evidently, the suits Chris had seen in the audience hall had indeed been Anderson's and Dulany's battle dress. Well, this ought to cure the baron of Castle Wolf-whip of the habit of exhibiting his scalps. It ought to cure him of the habit of kidnaping Okies, too. It occurred to Chris that the whole plan of using Anderson and Dulany as hostages, even in their underwear, was about as safe an operation as trying to imprison two demons in a corncrib.

Then they were back. Seeing them hovering in the collapsed corridor, their helmet lamps making a shifting, confusing pattern of shadows, Chris realized, too, what kind of vehicle the city would have sent out after him if he had managed to get word back.

"You all right?" Anderson's p.a. speaker demanded. "Good. Didn't occur to me that the floor might go."

They came into the cell. The guard, who had just recovered his senses, took one look and crawled into the corner farthest from the two steel figures.

"Now we've got a problem.

We've got a safe-conduct out of the castle, but we can't carry you through that storm, and we don't dare risk putting you in one of their suits."

"Boat," Dulany said, pointing at Chris.

"That's right, I forgot, he knows how to drive one. O.K. boy, stick your elbows out and we'll fly you out to where there's a floor you can walk on. Irish, let's go."

"One minute." Dulany unhooked a bunch of keys from his waist and tossed them into the corner where the guard was cowering. "Right."

Only Anderson joined him in the swan boat, still in his armor; Dulany stayed air-borne, in radio communication with Anderson, in case the colonials should have the notion of making the boat turn around and return home on autopilot. After he saw the holes the two cops had torn through the great walls of Castle Wolfwhip, Chris doubted that they'd even entertain such a notion, but obviously it was sensible not to take chances where it wasn't necessary.

The moment the boat was crawling across the bottom of the lake, Anderson took his helmet off and turned promptly to studying the control board. Finally he nodded and snapped three switches.

"That should do it."

"Do what?"

"Prevent them from putting this tub under remote control. In fact from this point on they won't even

be able to locate her. Now Irish can shoot on ahead of us and get the word to the Mayor." He put the helmet back on and spoke briefly, then doffed it.

"Now, Chris," he said grimly, "comes the riot act."

VIII

The "riot act" was every bit as unpleasant as he had foreseen it would be, but somehow he managed to live through it—mostly by bearing in mind as firmly as possible that he had it coming. He was never likely to become a real Okie by stealing the property of people who had hired the city to do a job, no matter how good he thought his reasons were.

And in this first disastrous instance he had simply been in the way. The city would have known soon enough, in any event, of the fact that Anderson and Dulany were being held prisoner, since the colonists of Heaven could not have used them effectively as hostages without notifying Amalfi of the fact; and there was no doubt in Chris' mind that the two cops could have gotten out of Castle Wolfwhip without his intervention, and perhaps a good deal faster, too. Above all, they might have been gotten out by Amalfi *without violence*, and thus saved the contract intact. The appearance of Chris as a third prisoner had been totally unwelcome to *both* sides, and had turned what had been merely a

tense situation into an explosion.

In the end, they gave him full marks for imagination and boldness, as well as for coolness under fire, but by that time Chris had learned enough about the situation to feel that his chances of ever becoming a citizen were not worth an Oc Dollar. The new contract was considerably more limited than the old, and called for reparations for the damage the two sergeants had done to Castle Wolfwhip; under it, the city stood to gain considerably less than before.

Chris was astonished that there was any new contract at all, and said so, rather hesitantly. Anderson explained:

"Violence between employer and employee is as old as man, Chris, but the work has to be done all the same. The colonists as a corporate entity disown the kidnaper and claim the right to deal with him according to their own system of justice, which we're bound to respect. Damage to real property, on the other hand, has to be paid for—and the city can't disown Irish and me because we're officers and agents of the city."

"But what about the scheme to ground the city and take it over?"

"We know nothing about that except what you overheard. That would have no status in a colonial court, and probably wouldn't even if you were a citizen—in this case, if you were of legal age."

And there it was again. "Well, there's something else I've been

wondering about," Chris said. "Why is the age to start the drugs fixed at eighteen? Wouldn't they work at any age? Suppose we took aboard a man forty years old who also happened to be a red-hot expert at something we needed. Couldn't you start him on the drugs anyhow?"

"We could and we would," Anderson assured him. "Eighteen is only the *optimum* age, the earliest age at which we can be sure the specimen is physically mature. You see, the drugs can't set the clock back. They just arrest aging from the moment when they're first given. Tell me, have you ever heard of the legend of Tithonus?"

"No, I'm afraid not."

"I don't know it very well myself; ask the City Fathers. But briefly, he got himself in the good books of the goddess of dawn, Eos, and asked for the gift of immortality. She gave it to him, but he was pretty old at the time. When he realized that he was just going to stay that way forever, he asked Eos to take the gift back. So she changed him into a grasshopper, and you know how long *they* live."

"Hm-m-m. A man who was going to be a permanent seventy-five wouldn't be much good to himself, I guess. Or to the city either."

"That's the theory," the perimeter sergeant agreed. "But of course we have to take 'em as we find 'em. Amalfi went on the drugs at fifty—which, for him, happened to be his prime."

Thus his education went on, much as before, except that he stayed scrupulously away from the docks. Since the new contract was limited to three months, there probably wouldn't have been much to see down there anyhow—or so he told himself, not without a suspicion that there were a few holes in his logic. In addition, he got some sympathy and support from a wholly unexpected source: Piggy Kingston-Throop.

"It just goes to show you how much truth there is in all this jabber about citizenship," he said fiercely, at their usual after-class meeting. "Here you go and do them a big fat favor, and all they can think of to do is lecture you for getting in their way. They even go right on doing business with these guys who were going to grab the city."

"Well, we do have to eat."

"Yeah, but it's dirty money all the same. Come to think of it, though, if I'd have been in your shoes I'd have handled it differently."

"I know," Chris said, "that's what they all keep telling me. I should never have gotten into the boat in the first place."

"Pooh, that part's all right," Piggy said scornfully. "If you hadn't gotten into the boat they'd never have known about the plot to take the city—that's the favor you did them, and don't you forget it. They're on their guard now. No, I mean what happened after you locked the guys up in the back

cabin. You said that the boat had bumped into the dock and was trying to climb it, right?"

"Yes."

"And a lot of cops came."

"I don't know about a lot," Chris said cautiously. "There were three or four, I think."

"O.K. Now if it had been me, I would have just stopped the boat right there, and gotten out and told the cops what I'd heard. Let *them* drag it out of the guys you'd locked up. You know how the City Fathers cram all that junk into our heads in class—well, they can take stuff out the same way. Dad says it's darned unpleasant for the victim, but they get it."

Chris could only shrug helplessly. "You're right, that would have been the sensible thing to do. And it seems obvious the way you tell it. But all I can say is, it didn't occur to me." He thought a moment, and then added: "But in a way I'm not too sorry, Piggy. That way, I never would have gotten to Castle Wolfwhip at all—sure, it would have been better if I hadn't—but it sure was exciting while I was there."

"Boy, I'll bet it was! I wish I'd been there!" Piggy began to shadowbox awkwardly. "I wouldn't have hidden in any cell, believe you me. I'd have showed 'em!"

Chris did his best not to laugh. "Going by what I heard, if you'd gone along with the sergeants—if they'd let you—you'd have been killed by your own friends. Those

weren't just rotten eggs they were throwing around."

"All the same, I'll bet . . . hullo, we're lifting."

The city had not lifted yet, but Chris knew what Piggy meant; he, too, could hear the deepening hum of the spindizzies. "So we are. That three months sure flew by."

"Three months isn't much in space. We'll be eighteen before we know it."

"That," Chris said gloomily, "is exactly what I'm afraid of."

"Well, I don't give a darn. This whole deal about your running off with the boat proves that they don't mean what they say about earning citizenship. Like I say, the whole thing's just a scheme to keep kids in line, so they won't have to be watched so much. The minute you actually *do* something for the survival of the city, bingo! the roof falls on you. Never mind that it was a good thing to do and shows you've got guts—you've caused them trouble, and that's what the system's supposed to prevent."

There was, Chris saw, something to be said for the theory, no matter how exaggerated Piggy's way of putting it was. In Chris' present state of discouragement, it would be a dangerously easy point of view to adopt.

Well, Piggy, what I want to know is, what are you going to do if you're wrong? I mean, supposing the City Fathers decide not to make

you a citizen, and it turns out that they can't be fixed? Then you'll be stuck with being a passenger for the rest of your life—and it'd only be a normal lifetime, too."

"Passengers aren't as helpless as they think," Piggy said darkly. "Some one of these days the Lost City is going to come back, and when that happens, all of a sudden the passengers are going to be top dog."

"The Lost City? I never heard of it."

"Of course you haven't. And the City Fathers won't ever tell you about it, either. But word gets around."

"O.K., don't be mysterious," Chris said. "What's it all about?"

Piggy's voice dropped to a hoarse whisper. "Do you swear not to tell anybody else, except another passenger?"

"Sure."

Piggy looked elaborately over both shoulders before going on. As usual, they were the only youngsters on the street, and none of the adults were paying the slightest attention to them.

"Well," he said in the same tone of voice, "it's like this. One of the first cities ever to take off was a big one. Nobody knows its name, but I think it was Los Angeles. Anyhow, it got lost, and ran out of drugs, and then out of food, way off in some part of space that was never colonized, so it couldn't find any work either. But then they made a planetfall on a new world, some-

thing nobody had ever seen before. It was like Earth—bigger, but the same gravity, and a little more oxygen in the air, and a perfect climate—like spring all year round, even at the poles. If you planted seeds there, you had to jump back in a hurry or the plant would hit you under the chin, they grew so fast.

"But that wasn't the half of it."

"It sounds like plenty," Chris said.

"That was all good, but they found something else even better. There was a kind of grain growing wild there, and when they analyzed it to see whether or not it was good to eat, *they found it contained an anti-death drug*—not any of ours, but better than all of ours rolled into one. They didn't even have to extract it—all they had to do was make bread out of the plant."

"Wow. Piggy, is this just a story?"

"Well, I can't give you an affidavit," Piggy said, offended. "Do you want to hear the rest, or don't you?"

"Go ahead," Chris said hastily.

"So then the question was, what were they going to do with their city? They didn't need it—everything they needed came right up out of the ground while their backs were turned. So they decided to stock it up and send it out into space again, to look for other cities. Whenever they make contact with a new Okie town, they take all the passengers off—nobody else—and

take them back to this planet where *everybody* can have the drugs, because there's never any shortage."

"Suppose the other city doesn't want to give up its passengers?"

"Why wouldn't it want to? If it had any use for them, they'd be citizens, wouldn't they?"

"Yes, but just suppose."

"They'd give them up anyhow. Like I said, the Lost City is *big*."

Unfortunately for the half-million other questions Chris wanted to ask, at that point the city moaned softly to the sound of the take-cover siren. The boys parted hurriedly; but Chris, after a moment's thought, did not go home. Instead, he holed up in a public information booth, where he fed his card into the slot and asked for the Librarian.

He had promised not to mention the Lost City to anyone but another passenger, which ruled out questioning his guardian, or the City Fathers directly; but he had thought of a way to ask an indirect question. The Librarian was that one of the one hundred thirty-four machines comprising the City Fathers which had prime charge of the memory banks; and was additionally charged with teaching; it did not collect information, but only catalogued and dispensed it. Interpretation was not one of its functions.

"CARD ACCEPTED. PROCEED."

"Question: Do any anti-agathics grow naturally . . . I mean, do

they occur in plants that could be raised as crops?"

A brief pause. "A PRECURSOR OF THE ANTI-SLEEP DRUG IS A STEROID SUBSTANCE OCCURRING NATURALLY IN A NUMBER OF YAM-LIKE PLANTS FOUND ON EARTH, LARGELY IN CENTRAL AND SOUTH AMERICA. THIS SAPOGENIN IS NOT, HOWEVER, IN ITSELF AN ANTI-AGATHIC, AND MUST BE CONVERTED; HUNDREDS OF DIFFERENT STEROIDS ARE PRODUCED FROM THE SAME STARTING MATERIAL.

"ASCOMYCIN IS PRODUCED BY DEEP-TANK FERMENTATION OF A MICRO-ORGANISM AND HARVESTED FROM THE BEER. THIS PROCEDURE MIGHT BROADLY BE DEFINED AS CROP-RAISING.

"ALL OTHER KNOWN ANTI-AGATHICS ARE WHOLLY SYNTHETIC DRUGS."

Chris sat back, scratching his head in exasperation. He had hoped for a clear-cut, yes-or-no answer, but what he had gotten stood squarely in the middle. No anti-agathics were harvested from real crops; but if a crop plant could produce something at least enough like an anti-agathic to be converted into one, then that part of Piggy's astounding story was at least possible. Unhappily, he could think of no further questions sufficiently indirect to keep his main point of interest hidden.

Then he noticed that the booth had not returned his card to him. This was quite usual; it meant only that the Librarian, which spent its whole mechanical life substituting

free association for thinking, had a related subject it would talk about if he liked. Usually it wasn't worth while exploring these, for the Librarian could go on forever if so encouraged; all he needed to do now was to say "Return," and he could take his card and go. But the take-cover alert wasn't over yet; so, instead, he said, "Proceed."

"SUBJECT, ANTI-AGATHICS AS BY-PRODUCTS OF AGRICULTURE. SUB-SUBJECT, LEGENDARY IDYLIC PLANETS." Chris sat bolt upright. "ANTI-AGATHICS AS BY-PRODUCTS OF AGRICULTURE, USUALLY IN THE DAILY BREAD, IS ONE OF THE COMMON FEATURES OR DIAGNOSTIC SIGNS OF THE LEGENDARY PLANETS OF NOMAD CITY MYTHOLOGY. OTHERS INCLUDE: EARTHLIKE GRAVITY BUT GREATER LAND AREA; EARTHLIKE ATMOSPHERE BUT MORE ABUNDANT OXYGEN; EARTHLIKE WEATHER BUT WITH UNIFORM CLIMATE, AND COMPLETE ISOLATION FROM EXISTING TRADE LANES. NO PLANET MATCHING THIS DESCRIPTION IN ANY PARTICULAR HAS YET BEEN FOUND. NAMES OFTEN GIVEN TO SUCH WORLDS INCLUDE: ARCADY, BRADBURY, CELEPHAIS . . ."

Chris was so stunned that the Librarian had worked it way all the way through "Zimiamvia" and had begun another alphabetical catalogue before he thought to ask for his card back. His question had not been very crafty, after all.

By the time he emerged from the booth, the storms of Heaven had vanished and the city was once more soaring amid the stars. Fur-

thermore, he was late for dinner.

So, after all, there had been no secret to keep. Chris told the Andersons the story of his failure to outwit the Librarian; it made the best possible excuse for his lateness, since it was true, and it reduced Carla to tears of helpless laughter. The perimeter sergeant was amused, too, but there was an undercurrent of seriousness beneath his amusement.

"You're learning, Chris. It's easy to think that because the City Fathers are dead, they're also stupid; but you see that that isn't the case. Otherwise they would never have been given the power that they wield—and in some departments their power is absolute."

"Even over the Mayor?"

"Yes and no. They can't forbid the Mayor anything. But if he goes against their judgment more often than they're set to tolerate, they can revoke his office. That's never happened here, but if it does, we'll have to sit still for it. If we don't, they'll stop the machinery."

"Wow. Isn't it dangerous to give machines so much power? Suppose they had a breakdown?"

"If there were only a few of them, that would be a real danger; but there are more than a hundred, and they monitor and repair each other, so in fact it will never happen. Sanity and logic is their stock in trade—which is why they can accept or reject the results of any

election we may run. The popular will is sometimes an idiot, but no human being can be given the power to overrule it; not safely. But the machines can.

"Of course, there are stories about towns whose City Fathers ran amok with them. They're just stories, like Piggy's 'Lost City'—but they're important even when they're not true. Whenever a new way of living appears in the universe, the people who adopt it see quickly enough that it isn't perfect. They try to make it better, sure; but there are always some things about it that can't be changed. And the hopes and fears that are centered on those points get turned into stories.

"Piggy's myth, for instance. We live long lives in the cities, but not everybody can have the gift. It's impossible that everyone should have it—the whole universe isn't big enough to contain the sheer mass of flesh that would accumulate if we all lived and bred as long as we each wanted to. Piggy's myth says it is possible, which is untrue; but what *is* true about it is that it points to one of the real dissatisfactions with our way of living, real because nothing can be done about it.

"The story of the runaway City Fathers is another. No such thing has ever happened as far as I know, and it doesn't seem to be possible. But no live man *likes* to take orders from a bunch of machines, or to think that he may lose his life if

they say so—but he might, because the City Fathers are the jury aboard most cities. So he invents a cautionary tale about City Fathers running amok, though actually he's talking not about the machines at all—he's warning that *he* may run amok if he's pushed too far.

"The universe of the cities is full of these ghosts. Sooner or later somebody is going to tell you that some cities go bindlestiff."

"Somebody has," Chris admitted. "But I didn't know what he meant."

"It's an old Earth term. A hobo was an honest migratory worker, who lived that way because he liked it. A tramp was the same kind of fellow, except that he wouldn't work—he lived by stealing or begging from settled people. In hobo society both kinds were more or less respectable. But the bindlestiff was a migrant who stole from other migrants—he robbed their bindles, the bags they carried their few belongings in. That man was an outcast from both worlds.

"It's common talk that some cities in trouble have gone bindlestiff—taken to preying on other cities. Again, there are no specific instances. IMT is the town that's most often mentioned, but the last we heard of IMT, she wasn't a bindlestiff—she'd been outlawed for a horrible crime on a colony planet, but technically that makes her only a tramp. A mean one, but still only a tramp."

"I see," Chris said slowly. "It's

like the story about City Fathers going crazy. Cities do starve, I know that; and the bindlestiff story says, 'How will *we* behave when the pinch comes?' "

Anderson looked gratified. "Look at that," he said to Carla. "Maybe I should have been a teacher!"

"Nothing to do with you," Carla said composedly. "Chris is doing all the thinking. Besides, I like you better as a cop."

The perimeter sergeant sighed, a little ruefully. "Oh, well, all right. Then I'll give you only one more story. You've heard of the Vegan orbital fort?"

"Oh, sure. That was in the history, way back."

"Good. Well, for once, that's a real thing. There was a Vegan orbital fort, and it did get away, and nobody knows where it is now. The City Fathers say that it probably died when it ran out of supplies, but it was a pretty big job and might well have survived under circumstances no ordinary city could live through. If you ask the City Fathers for the probabilities, they tell you that they can't give you any figures—which is a bad sign in itself.

"Now, that's as far as the facts go. But there's a legend to go with them. The legend says that the fort is foraging through the trade-lanes, devouring cities—just like a dragonfly catches mosquitoes, on the wing. Nobody has actually seen the fort since the scorching of Vega,



but the legend persists; every time a city disappears, the word goes around, first, that a bindlestiff got it, and next, that the fort got it.

"What's it all about, Chris? Tell me."

Chris thought for a long time. At last he said:

"I'm kind of confused. It ought to be the same kind of story as the others—something people are afraid of. Like meeting up some day with a planet, like the Vegan system, where the people have more on the ball than we do and will gobble us up the way we did Vega—"

Anderson's big fist crashed down on the dinner table, making all the



plates jump. "Precisely!" he
crowded. "Look there, Carla—"

Carla's own hands reached out
and covered the sergeant's fist
gently. "Dear, Chris isn't through

yet. You didn't give him a chance
to finish."

"I didn't? But . . . sorry, Chris.
Go ahead."

"I don't know whether I'm

through or not," Chris said, embarrassed and floundering. "This one story just confuses me. It's not as simple as the others, I think I'm sure of that."

"Go ahead."

"Well, it's sensible to be afraid of meeting somebody stronger than yourself. It might well happen. And there is a real Vegan orbital fort, or at least there was one. The other stories don't have that much going for them that's real—except the things people are actually afraid of, the things the stories *actually* are about. Does this make sense?"

"Yes. The things the stories symbolize."

"That's the word. To be afraid of the fort is to be afraid of a real thing. But what does the story symbolize? It's got to be the same kind of thing in the end—the fear people have of themselves. The story says, 'I'm tired of working to be a citizen—and obeying the Earth cops—and protecting the city—and living a thousand years with machines bossing me—and taking sass from colonists—and, I don't know what all else. If I had a great big city that I could run all by myself, I'd spend the next thousand years smashing things up!'"

There was a long, long silence, during which Chris became more and more convinced that he had again talked out of turn, and far too much. Carla did not seem to be upset, but her husband looked stunned and wrathful.

"There *is* something wrong with the apprenticeship system," he growled at last, though he did not appear to be speaking to either of them. "First the Kingston-Throop kid—and now this. Carla! You're the brains in the family. Did it ever occur to you that that fort legend had anything to do with education?"

"Yes, dear. Long ago."

"Why didn't you say so?"

"I would have said so as soon as we had a child; until then, it wasn't any of my business. Now Chris has said it for me."

The perimeter sergeant turned a lowering face on Chris. "You," he said, "are a holy terror. I set out to teach you, as I was charged to do, and you wind up teaching me. Not even Amalfi knows this side of the fort story, I'll swear to that—and when he hears it, there's going to be a real upheaval in the schools."

"I'm sorry," Chris said miserably. He did not know what else to say.

"Don't be sorry!" Anderson roared, surging to his feet. "Stick to your guns! Let the other guy be afraid of ghosts—you know the one thing about ghosts that you need to know, no matter what kind of ghosts they are: they have nothing to do with the dead. It's *always* themselves that people are afraid of."

He looked about distractedly. "I've got to go topside. Here's my hurry—where's my hat?" He roared out, banging one hand against the

side of the door, leaving Chris frozen with alarm.

Then Carla began to laugh all over again.

IX

But if the errand on behalf of which Sergeant Anderson had undertaken his rhinoceros-charge exit had really had anything to do with education, Chris had yet to see it reflected in his own. That got steadily harder, as the City Fathers, blindly and impersonally assuming that he had comprehended what they had already stuffed into his head, began to build his store of knowledge toward some threshold where it would start to be useful for the survival of the city. As this process went forward, Chris' old headaches dwindled into the category of passing twinges; these days, he sometimes felt actively, physically sick from sheer inability to make sense of what was being thrust upon him. In a moment of revulsion, he told the City Fathers so.

"IT WILL PASS. THE NORMAL HUMAN BEING FEB IS AN AVERAGE OF TWENTY SMALL PAINS PER HOUR. IF ANY PERSIST, REPORT TO MEDICAL."

No, he was not going to do that; he was not going to be invalidated out of his citizenship if he could help it. Yet it seemed to him that what he was suffering couldn't fairly be called "small pains." What to do, since he feared that Medical's cure would be worse than

the disease? He didn't want to worry the Andersons, either—he had repaid their kindnesses with enough trouble already.

That left nobody to talk to but Dr. Braziller, that fearsome old harpy who seldom spoke in any language but logarithms and symbolic logic. Chris stood off from this next-but-worst choice for weeks; but in the end he had to do it. Though there was nothing physically wrong with him even now, he had the crazy notion that the City Fathers were about to kill him; one more stone of fact on his head and his neck would break.

"And well it might," Dr. Braziller told him, in her office after class. "Chris, the City Fathers are not interested in your welfare; I suppose you know that. They're interested in only one thing: the survival of the city. That's their prime directive. Otherwise they have no interest in people at all; after all, they're only machines."

"All right," Chris said, blotting his brow with a trembling hand. "But Dr. Braziller, what good will it do the city for them to blow all my fuses? I've been trying, really I have. But it isn't good enough for them. They keep right on piling the stuff in, and it makes no sense to me!"

"Yes, I've noticed that. But there's reason behind what they're doing, Chris. You're almost eighteen; and they're probing for some entrance-point into your talents—some spark that will take fire,

some bent of yours that might some day turn into a valuable specialty."

"I don't think I have any," Chris said dully.

"Maybe not. That remains to be seen. If you have one, they'll find it; the City Fathers never miss on this kind of thing. But Chris, my dear, you can't expect it to be easy on you. Real knowledge is always hard to come by—and now that the machines think you might actually be of some use to the city—"

"But they can't think that! They haven't found anything!"

"I can't read their minds, because they haven't any," Dr. Braziller said quietly. "But I've seen them do this before. They wouldn't be driving you in this way if they didn't suspect that you're good for something. They're trying to find out what it is, and unless you want to give up right now, you're going to have to sit still while they look. It doesn't surprise me that it makes you ill. It made me ill, too; I feel a little queasy just remembering it, and that was eighty years ago."

She fell silent suddenly, and in that moment, she looked even older than she had ever seemed before . . . old, and frail, and deeply sad . . . and—could it be possible?—beautiful.

"Now and then I wonder if they were right," Dr. Braziller told the heaped papers on her desk. "I wanted to be a composer. But the City Fathers had never heard of a successful woman composer, and it's hard to argue with that kind of

charge. No, Chris, once the machines have fingered you, you have to be what they want you to be; the only alternative is to be a passenger—which means, to be nothing at all. I don't wonder that it makes you ill. But Chris—fight back, fight back! Don't let those cabinet-heads lick you! Stick them out. They're only probing, and the minute we find out what they want, we can bear down on it. I'll help wherever I can—I *hate those things*. But first, we have to find out what they want. Have you got the guts, Chris?"

"I don't know. I'll try. But I don't know."

"Nobody knows, yet. They don't know themselves—that's your only hope. They want to know what you can do. You have to show them. As soon as they find out, you will be a citizen—but until then, it's going to be rough, and there will be nothing that anybody can do to help you. It will be up to you, and you alone."

It was heartening to have another ally, but Chris would have found Dr. Braziller's whole case more convincing had he been able to see the faintest sign of a talent—any talent at all—emerging under the ungentle ministrations of the machines. True, lately they had been bearing down heavily on his interest in history—but what good was that aboard an Okie city? The City Fathers themselves were the city's historians, just as they were its library, its accounting department,

its schools and much of its government. No live person was needed to teach the subject or to write about it, and at best, as far as Chris could see, it could never be more than a hobby for an Okie citizen.

Even in the present instance, Chris was not being called upon to *do* anything with history but pass almost incredibly hard tests in it—tests which consisted largely of showing that he had retained all of the vast mass of facts that the City Fathers were determinedly shoving into him. And this was no longer just history from the Okie point of view. Whole systems of world and interstellar history—Machiavelli, Plutarch, Thucydides, Gibbon, Marx, Pareto, Spengler, Sarton, Toynbee, Durant and a score of others—came marching through the gray gas into his head without mercy and with apparent indifference to the fact that they all contradicted each other fatally at crucial points.

There was no punishment for failures, since the City Fathers' pedagogy made failure of memory impossible, and it was only his memory that they seemed to be exploiting here. Instead, punishment was continuous: It lay in the certainty that though today's dose had been fiendish, tomorrow's would be worse.

"Now there you're wrong," Dr. Braziller told him. "Dead though they are, the machines aren't ignorant of human psychology—far from it. They know very well that

some students respond better to reward than to punishment, and that others have to be driven by fear. The second kind is usually the less intelligent and they know that too, how could they *not* know it after so many generations of experience? You're lucky that they've put you in the first category."

"You mean they're *rewarding* me?" Chris squeaked indignantly.

"Certainly."

"But how?"

"By letting you go on studying even when they're not satisfied with your progress. That's quite a concession, Chris."

"Maybe so," Chris said glumly. "But I'd get the point faster if they handed out lollipops instead."

Dr. Braziller had never heard of lollipops; she was an Okie. She only responded, a little primly: "You'd get it fast enough if they decided on a punishment system for you instead. They're rigidly just, but know nothing about mercy; and leniency with children is utterly foreign to them—which is one reason why I'm here."

The city hummed onward, and so did the days—and the months. Only Chris seemed to be making no progress in any visible direction.

No, that wasn't quite true. Piggy was going nowhere, either, as far as Chris could see. But there the situation was even more puzzling and full of complications. To begin with, ever since Chris had

first met him, Piggy had been denying that he cared about what happened to him when he turned eighteen; so it was odd—though not entirely surprising—to discover that he did care, after all. In fact, though his situation appeared to be now quite hopeless, Piggy was full of loud self-confidence . . . belied in the next breath by dark hints of mysterious plans to cinch what was supposed to be cinched already, and even darker hints of awful things to come if it didn't turn out to be cinched. It was all more than Chris could manage to sort out, especially considering his inability to see more than half a minute into his own future. Some days he felt as though Piggy's old accusation—"Boy, you *are* dumb!"—were written on his forehead in letters of fire.

Although Piggy said almost nothing about it, Chris gathered that he had already approached his father on the subject of biasing the City Fathers in his favor on the Citizenship Tests, and had been rebuffed with a loud roar, only slightly tempered by the intervention of his mother. There was of course no way to study for the Tests, since they measured nothing but potentials, not achievements; which meant, in turn, that there was no such thing as a pony for them.

Now, it was obvious, Piggy was thinking back to Chris' adventure on Heaven. Judging by the questions he asked about it, Chris deduced that Piggy was searching for something heroic to do, in order to

do it much better than Chris had. Chris was human enough to doubt that Piggy could make a much better showing, but in any event the city was still in space, so no opportunity offered itself.

Occasionally, too, he would disappear after class for several days running. On his return, his story was that he had been prowling around the city eavesdropping on the adult passengers. They were, Piggy said, up to something—just possibly, the building of a secret Dirac transmitter with which to call the Lost City. Chris did not believe a word of this, nor did he think Piggy did either.

The simple, granite-keel facts were that time was running out for both of them, and that desperation was setting in: for Piggy because he had never tried, and for Chris because nothing he tried seemed to get him anywhere. All around them their younger schoolmates seemed to be opening into talents with the violence and unpredictability of popcorn, turning everything the memory cells fed them into salt and savor no matter how high the heat was turned up. In comparison, Chris felt as retarded as a dinosaur, and just as clumsy and gigantic.

It was in this atmosphere of pervasive, incipient failure that Sergeant Anderson one evening said calmly:

"Chris, the Mayor wants to talk to you."

From anyone else, Chris would have taken such an announcement as a practical joke, too absurd to be even upsetting. From Sergeant Anderson he did not know how to take it; he simply stared.

"Relax—it isn't going to be an ordeal, and besides I didn't say he wanted to *see* you. Sit back down and I'll explain."

Numbly, Chris did so.

"What's happened is this: We're approaching another job of work. From the first contacts we had with these people, it sounded simple and straightforward, but of course nothing ever is. (Amalfi says the biggest lie it's possible to tell in the English language is, 'It was as simple as that.')

Supposedly we were going to be hired on to do a straightforward piece of local geology and mining—nothing so tricky as changing the whole setup of a planet, just a standard piece of work. You've seen the motto on City Hall?"

Chris had. It read: *MOW YOUR LAWN, LADY?* It had never seemed very dignified to him, but he was beginning to understand what it implied. He nodded.

"Well, that's the way it's always supposed to be: We come in, we do a job, we go out again. Local feuds don't count; we take no part in them:

"But as we got closer to signing a contract with this place—it's called Argus III—we began to get hints that we were second-comers. Apparently there'd already been

one city on Argus, hired to do the job, but hadn't done it well.

"We tried to find out more about this, naturally, to be sure the Argidae were telling a straight story; we didn't want to be poaching on any other city's contract. But the colonists were very vague about the whole thing. Finally, though, they let it slip that the other city was still sitting on their planet, and still claimed to be working on the job, even though the contract deadline had passed. Tell me . . . what would you do in a case like that, if you were Amalfi?"

Chris frowned. "I don't know any other answer but the one in the books. If the planet has an overstayed city, it's supposed to call the cops. All other cities should stay clear, otherwise they might get involved in the shooting, if there is any."

"Right; and this appears to be a classic case. The colonists can't be too explicit because they know that every word they broadcast to us is going to be overheard; but the City Fathers have analyzed what Argus III *has* sent us, and the chances are a hundred to one that that other city has settled on Argus III for good . . . in short, that it means to take over the planet. The Argidae don't want to call the cops, for reasons we don't know. Instead, they seem to be trying to hire us to take on this tramp city and clear him out. If we tackle that, there *will* be shooting, that's for sure—and the cops will probably

show up anyhow before it's over.

"Obviously, as you say, the thing to do is get out of the vicinity, fast. Cities ought not to fight with each other, let alone get involved in anything like a violation. But Argus III's offering us sixty-three million dollars in metal to slough them off the tramp before the cops arrive, and the mayor thinks we can do it. Also, he hates tramps—I think he might even have taken on the job for nothing. The fact, anyhow, is that he *has* taken it."

The perimeter sergeant paused and eyed Chris, seemingly waiting for comments. At last Chris said: "What did the City Fathers say?"

"They said NO in a loud voice until the money was mentioned. After that they ran an accounting of the treasury, and gave Amalfi his head. They had a few additional facts to work from that I haven't told you yet, most of which seem to indicate that we can dispossess this tramp without too much damage to our own city, and very possibly before the cops even hear that anything's happening. All the same, bear in mind that they think of nothing but the city as a whole. If some of us get killed in the process they won't care, as long as the city itself gets off cleanly. They're not sentimental."

"I already know that," Chris said, with feeling. "But . . . how do I come into all this? Why does the mayor want to talk to me? I

don't know anything but what you've told me—and besides, he's already made up his mind."

"He's made up his mind," Anderson agreed, "but you know a lot that he doesn't know. As we get closer to Argus III, he wants you to listen to the broadcasts from the Argidae, and anything we may pick up from the tramp, and fill him in on any clues you hear."

"But why?"

"Because you're the only person on board who knows the tramp at first hand," he perimeter sergeant said, with slow, deliberate emphasis. "It's your old friend Scranton."

"But . . . that can't be so! There were hundreds of us put on board from Scranton—all adults but me . . ."

"Press gang sweepings," Anderson said with cold disgust. "Oh there were one or two specialists we found a use for, but none of them ever paid any attention to city politics. The rest were bulgy-muscle misfits, a large proportion of them psychotics. We cured them, but we couldn't raise their IQ's; without something to sell, or the Interplanetary Grand Prix, or heavy labor to keep their minds off their minds, they're just so many vegetables. We—Irish and I—couldn't find even one worth taking into our squads. We've made citizens of the three good specialists, but the rest will be passengers till they die."

"But you're the happy accident of that crew right now, Chris. The City Fathers say that your history

aboard Scranton shows that you *know* something about the town. Amalfi wants to mine that knowledge. Want to tackle it?"

"I . . . I'll try."

"Good." The perimeter sergeant turned to the miniature tape recorder at his elbow. "Here's a complete transcript of everything we've heard from Argus III so far. After you've heard it and made any comments that occur to you, Amalfi will begin to feed us the live messages, from the bridge. Ready?"

"No," Chris said, more desperately than he could ever have imagined possible for him. "Not yet. My head is about to bust already. Do I get off from school while this is going on? I couldn't take it, otherwise."

"No," Anderson said, "you don't. If a live message comes through while you're in class, we'll pull you out. But you'll go right back in again. Otherwise your schooling will go right on just as before, and if you can't take the new burden, well, that'll be too bad. You'd better get that straight right away, Chris. This isn't a vacation, and it isn't a prize. It's a job, *for the survival of the city*. Either you take it or you don't; either way, you get no special treatment. Well?"

For what seemed to him to be a long time, Chris sat and listened to his echoing Okie headache. At last, however, he said resignedly:

"I'll take it."

Anderson snapped the switch,

and the tape began to run on the spools.

The earliest messages, as Anderson had noted, were vague and brief. The later ones were longer, but even more cryptic. Chris was able to worry very little more information out of them than Amalfi and the City Fathers already had. As promised, he spoke to Amalfi—but from the Andersons' apartment, through a hookup which fed what he had to say to the mayor and to the machines simultaneously.

The machines asked questions about population, energy resources, degree of automation and other vital matters, not a one of which Chris could answer. The mayor mostly just listened; on the few occasions when his heavy voice cut in, Chris was unable to figure out what he was getting at.

"Chris this railroad you mentioned; how long before you were born had it been pulled up?"

"About a century sir, I think. You know Earth went back to the railroads in the middle two thousands, when all the fossil fuels ran out and they had to give up the highways to farmland."

"No, I didn't know that. All right, go ahead."

Now the City Fathers were asking him about armament. He had no answer for that one, either.

There came a day, however, when this pattern changed suddenly and completely. He was, indeed, pulled out of class for the

purpose, and hurried into a small anteroom containing little but a chair and two television screens. One of the screens showed Sergeant Anderson; the other, nothing but a testing pattern.

"Hello, Chris. Sit down and pay attention; this is important. We're getting a transmission from the tramp city. We don't know whether it's just a beacon or whether they want to talk to us. Amalfi thinks it's unlikely that they'd be putting out a beacon in their situation, regardless of the law—they've broken too many others already. He's go-

ing to try to raise them, now that you're here; he wants you to listen."

"Right, sir."

Chris could not hear his own city calling; but after only a few minutes—for they were quite close to Argus III now—the test pattern on the other screen vanished, and Chris saw an odiously familiar face.

"Hullo. This here's Argus III."

"This-here is *not* Argus III," Amalfi's deep voice said promptly. "This-here is the city of Scranton Pennsylvania, and there's no point



in your hiding it. Get me your boss."

"Now wait a minute. Just who do you think—"

"This *here* is New York New York calling, and I said, 'Get me your boss.' Go do it."

The face by now was both sullen and confused. After a moment's hesitation, it vanished. The screen flickered, the test pattern came back briefly, and then a second familiar face was looking directly at Chris. It was impossible to believe that the man couldn't see him, and the idea was outright frightening.

"Hello, New York," he said, affably enough. "So you've got us figured out. Well, we've got you figured out, too. This planet is under contract to us; be notified."

"Recorded," Amalfi said. "We also have it as a matter of record that you are in Violation. Argus Three has made a new contract with us. It'd be the wisest course to clear ground and spin."

The man's eyes did not waver. Chris realized suddenly that it was an image of Amalfi he was staring at, not at Chris himself. "Spin yourself," he said evenly. "Our argument is with the colonists, not with you. We don't spin without a Vacate order from the cops. Once you mix in this, you may find it hard to mix out again. Be notified."

"Your self-confidence," Amalfi said, "is misplaced. Recorded."

The image from Scranton contracted to a bright point and vanished. The mayor said at once:

"Chris, do you know either of those guys?"

"Both of them, sir. The first one's a small-time thug named Barney. I think he was the one who killed my brother's dog when I was impressed, but I didn't see who did it."

"I know the type. Go ahead."

"The other one is Frank Lutz. He was the city manager when I was aboard. Guess he still is."

"What's a city manager? Never mind, I'll ask the machines. All right. He looks dangerous; is he?"

"Yes, sir, he is. He's smart and he's tricky—and he has no more feeling than a snake."

"Sociopath," Amalfi said. "Thought so. One more question: Does he know you?"

Chris thought hard before answering. Lutz had seen him only once, and had never had to think about him as an individual again—thanks to the life-saving intervention of Frad Haskins. "Sir, he just might, but I'd say not."

"O.K. Give the details to the City Fathers and let them calculate the probabilities. Meanwhile we'll take no chances. Thanks, Chris. Joel, come topside, will you?"

"Yes, sir." Anderson waited until he heard the mayor's circuit cut out. Then his image, too, seemed to be staring directly at Chris. In fact, it was.

"Chris, did you understand what Amalfi meant about taking no chances?"

"Uh . . . no, not exactly."

"He meant that we're to keep you out of this Lutz's sight. In other words, *no deFord expeditions on this job*. Is that clear?"

It was all too clear.

X

The Argus system was well named: It was not far inside a crowded and beautiful cluster of relatively young stars, so that the nights on its planets had indeed a hundred eyes, like the Argus of the myth. The youth of the cluster went far toward explaining the presence of Scranton, for like all third-generation stars, the sun of Argus was very rich in metals, and so were its planets.

Of these there were only a few—just seven, to be exact, of which only the three habitable ones had been given numbers, and only Argus III actually colonized; II was suitable only for Arabs, and IV for Esquimaos. The other four planets were technically of the gas giant class, but they were rather undernourished giants; the largest of them was about the size of Sol's Neptune. The closeness of the stars in the cluster to each other had swept up much of the primordial gas before planet-formation had gotten a good start; the Argus system was in fact the largest yet to be encountered in the cluster.

Argus III, as the city droned down over it, looked heart-stoppingly like Pennsylvania; Chris began to feel a little sorry for the

coming dispossession of Scranton—of which he had no doubts whatsoever—for surely the planet must have provided an intolerable temperature. It was mountainous over most of its land area, which was considerable; water was confined to many thousands of lakes, and a few small and intensely salty seas. It was also heavily wooded—almost entirely with conifers, or plants much like them, for evolution here had not yet gotten as far as a flowering plant. The firlike trees had thick boles and reared up hundreds of feet, noble monsters with their many shoulders hunched, as they had to be to bear their own weight in the two-G gravitation of this metal-heavy planet. The first sound Chris heard on Argus III after the city grounded was the explosion of a nearby seed-cone, as loud as a crack of thunder. One of the seeds broke a window on the thirtieth floor of the McGraw-Hill Greenhouse, and the startled staff there had had to hack it to bits with fire-axes to stop its germinating on the rug.

Under these circumstances it hardly mattered where the city settled; there was iron everywhere; and conversely there was no place on the planet which would be out of eavesdropping or of missile range of Scranton, to the mutual inconvenience of both parties. Nevertheless, Amalfi chose a site with great care, one just over the horizon from the great scar in the ground Scranton had made during its fum-

bled mining attempt, and with the highest points of an Allegheny-like range reared up between the two Okies. Only then did the machinery begin to rumble out into the forests.

Chris was beginning to practice thinking like Amalfi—not very confidently to be sure, since he had never seen the man, but at least it made a good game. The landing, Chris concluded tentatively, had been chosen mostly to prevent Scranton from seeing what the city was doing without sending over planes; and secondly to prevent foot traffic between the two cities. Probably it would never come to warfare between the two cities anyhow, for nothing would be more likely to bring the cops to the scene in a hurry; and besides, it was already quite clear from New York's history that Amalfi actively hated anything that did the city damage, whether it was bombs or only rust.

In the past, his most usual strategy had been to out-sit the enemy. If that failed, he tried to out-perform them. As a last resort, he tried to bring them into conflict with themselves. There were no pure cases of any of these policies on record—every example was a mixture, and a complicated one—but these three flavorings were the strongest, and usually one was far more powerful than the other two. When Amalfi salted his dish, you could hardly taste the pepper or the mustard.

Not everyone could eat it there-

after, either; there were, Chris suspected, more subtle schools of Okie cookery. But that was how Amalfi did it, and he was the only chef the city had. Thus far, the city had survived him, which was the only test that counted with the citizens and the City Fathers.

On Argus III, it seemed, Amalfi's hope was to starve Scranton out by out-performing it. The city had the contract; Scranton had lost it. The city could do the job; Scranton had made a mess of it, and left behind a huge yellow scar around its planet-fall which might not heal for a century. And while New York worked and Scranton starved—here was where a faint pinch of out-sittery was added to the broth—Scranton couldn't carry through on its desperate hope of seizing Argus III as a new home planet; though the Argidae could not yell for the cops at the first sign—or the last—of such a piracy, New York could, and would. Okie solidarity was strong, and included a firm hatred of the cops . . . but it did not extend to encouraging another incident like Thor V, or bucking the cops against another city like IMT. Even the outlaw must protect himself against the criminally insane—especially if they seem to be on his side.

O.K.; if that was what Amalfi planned, so be it. There was nothing that Chris could say about it, anyhow. Amalfi was the mayor, and he had the citizens and the City Fa-

thers behind him. Chris was only a youngster and a passenger.

But he knew one thing about the plan that neither Amalfi nor any other New Yorker could know, except himself:

It was not going to work.

He knew Scranton; the city didn't. If this was how Amalfi planned to proceed against Frank Lutz, it would fail.

But was he reading Amalfi's mind aright? That was probably the first question. After several days of worrying—which worsened his school record drastically—he took the question to the only person he knew who had ever even seen Amalfi: his guardian.

"I can't tell you what Amalfi's set us up to do, you aren't authorized to know," the perimeter sergeant said gently. "But you've done a lot of good guessing. As far as you've guessed, Chris, you're pretty close."

Carla banged a coffee cup angrily into a saucer. "Pretty close? Joel, all this male expertise is a pain in the neck. Chris is right and you know it. Tell him so."

"I'm not authorized," Anderson said doggedly, but from him that was tantamount to an admission. "Besides, Chris is wrong on one point. We can't sit here forever, just to prevent this tramp from taking over Argus III. Sooner or later we'll have to be on our own way, and we can't overstay our contract, either—we've got Violations of our own on our docket

that we care about, whether Scranton cares about Violations or not. We have a closing date that we mean to observe—and that makes the problem *much* stiffer."

"I see it does," Chris said diffidently. "But at least I understood part of it. And it seems to me that there are two big holes in it—and I just hope I'm wrong about those."

"Holes?" the perimeter sergeant said. "Where? What are they?"

"Well, first of all, they're probably pretty desperate over there, or if they aren't now, they soon will be. The fact that they're in this part of space at all, instead of wherever it was the Mayor directed them, back when I came on board here, shows that something went wrong with their first job, too."

Anderson snapped a switch on his chair. "Probability?" he said to the surrounding air.

"SEVENTY-TWO PER CENT," the air said back, making Chris start. He still had not gotten used to the idea that the City Fathers overheard everything one said, everywhere and all the time; among many other things, the city was their laboratory in human psychology, which in turn enabled them to answer such questions as Anderson had just asked.

"Well, score another for you," the sergeant said in a troubled voice.

"But I hadn't quite gotten to my point yet, sir. The thing is, now *this* job has gone sour on them too, so they must be awfully low on

supplies. No matter how good our strategy is, it has to assume that the other side is going to react logically. But desperate men almost never behave logically; look at German strategy in the last year of World War II, for instance."

"Never heard of it," Anderson admitted. "But it seems to make sense. What's the other hole?"

"The other one is really only a guess," Chris said. "It's based on what I know about Frank Lutz, and I only saw him twice, and heard one of his aides talk about him. But I don't think he'd ever allow anybody to outbluff him; he'd always fight first. He has to prove he's the toughest guy in any situation, or his goose is cooked—somebody else'll take over. It's always like that in a thug society—look at the history of the Kingdom of Naples, or Machiavelli's Florence."

"I'm beginning to suspect you're just inventing these examples," Anderson said, frowning blackly. "But again, it does make a certain amount of sense—and nobody but you knows even a little about this man Lutz. Supposing you're right; what could we do about it that we're not doing now?"

"You could use the desperation," Chris said eagerly. "If Lutz and his gang are desperate, then the ordinary citizen must be on the edge of smashing things up. And I'm sure they don't have any 'citizens' in our sense of the word, because the aide I mentioned before let slip that

they were short on the drugs. I think he meant me to overhear him, but it didn't mean anything to me at the time. The man on the street must hate the gang even in good times. We could use them to turn Lutz out."

"How?" Anderson said, with the air of a man posing a question he knows to be unanswerable.

"I don't know exactly. It'd have to be done more or less by feel. But I used to have at least two friends over there, one of them with constant access to Lutz. If he's still around and I could sneak over there and get in touch with him—"

Anderson held up a hand and sighed. "I was kind of afraid you were going to trot out something like that. Chris, when are we going to cure you of this urge to go junketing? You know what Amalfi said about that."

"Circumstances alter cases," Carla put in.

"Yes, but . . . oh, all right, all right, I'll go one step farther, at least." Once more he snapped the switch, and said to the air: "Comments?"

"WE ADVISE AGAINST SUCH A VENTURE, SERGEANT ANDERSON. THE CHANCE THAT MISTER DEFORD WOULD BE RECOGNIZED IS PROHIBITIVELY HIGH."

"There, you see?" Anderson said. "Amalfi would ask them the same question. He ignores their advice more often than not, but in this case what they say is just what he's already decided himself."

"O.K.," Chris said, not very much surprised. "It's a pretty fuzzy sort of idea, I'll admit. But it was the only one I had."

"There's a lot to it. I'll tell the Mayor your two points, and suggest that we try to do something to stir up the animals over there. Maybe he'll think of another way of tackling that. Cheer up, Chris; it's a darned good thing you told me all this, so you shouldn't feel bad if a small part of what you said gets rejected. You can't win them all, you know."

"I know," Chris said. "But you can try."

If Amalfi thought of any better idea for "stirring up the animals" in Scranton, Chris did not hear of it; and if he tried it, obviously it had no significant effect. While the city worked, Scranton sat sullenly where it was, ominously silent, while New York's contract termination date drew closer and closer. Poor and starving though it must have been, Scranton had no intention of being outsat at the game of playing for so rich a planet as Argus III; if Amalfi wanted Scranton off the planet, he was going to have to throw it off—or call for the cops. Frank Lutz was behaving pretty much as Chris had predicted, at least so far.

Then, in the last week of the contract, the roof fell in.

Chris got the news, as usual, from his guardian. "It's your friend

Piggy," he said wrathfully. "He had the notion that he could pretend to turn his coat, worm his way into Scranton's government, and then pull off some sort of coup. Of course Lutz didn't believe him, and now we're all in the soup."

Chris was torn between shock and laughter. "But how'd he get there?"

"That's one of the worst parts of it. Somehow he sold two women on the idea of being deadly female spies, concubine type—as if a thug government ever had any shortage of women, especially in a famine! One of them is a sixteen-year-old girl whose family is spitting flames—for every good reason. The other is a thirty-year-old passenger who's the sister of a citizen, and *he's* one of Irish Dulany's fighter pilots. The sister, the City Fathers tell us now, is a borderline psychotic, which is why she never made citizenship herself; but they authorized the brother to teach her to fly because it seemed to help her clinically. She stole the boarding squad plane for the purpose, and by the time we got the whole story from the machines, it was all over."

"You mean that the City Fathers heard Piggy and the others planning all this?"

"Sure they did. They hear everything—you know that."

"But why didn't they tell somebody?" Chris demanded.

"They're under orders never to volunteer information. And a good thing too, almost all the time;

without such an order they'd be jabbering away on all channels every minute of the day—they have no judgment. Now Lutz is demanding ransom. We'd pay any reasonable sum, but what he wants is the planet—you were right again, Chris, logic has gone out the window over there—and we can't give him what we don't own, and we wouldn't if we could. Piggy has gotten us into a war, and not even the machines can see what the consequences will be."

Chris blew out his breath in a long gust. "What are we going to do?"

"Can't tell you."

"No, I don't want to know about tactics or anything like that. Just a general idea. Piggy is a friend of mine—it sounds silly right now, but I really like him."

"If you don't like a man when he's in trouble, you probably never liked him at all," the perimeter sergeant agreed reflectively. "Well, I can't tell you very much more, all the same. In general terms, Amalfi is stalling, in a way he hopes will give Lutz the idea that he's going to give in, but won't give the Argidae the same impression; the machines have run him up a set of key words that should convey the one thing to the colonists and the other to Scranton. Contract termination is only a week away, and if we can stall Lutz until the day before that—well, I can't say what we'll do. But generally, again, we'll move in there and deprive

him of his marbles. That'll give us a day to get out of this system before the cops come running, and when they do catch us, at least they'll find that we have a fulfilled contract. Incidentally, it also gives us a day to collect our pay—"

"OVERRIDE," the City Fathers said suddenly, without being asked anything at all.

"Woof! Sorry. Either I've already said one word too many, or I was going to. Can't say anything else, Chris."

"But I thought they never volunteered information!"

"They don't," Anderson said.

"That wasn't volunteered. They are under orders from Amalfi to monitor talk about this situation and shut it up when it begins to get too loose. That's all I can say—and it's none of it the best news I ever spread."

Only a week to go—and the contract date, Chris realized for the first time, was exactly one day before his birthday. Everything was going to be gained or lost within the same three days: for himself, for Piggy and his two victims, for Scranton, for Argus III, for the city

And again he knew, as surely as he knew his left hand from his right, that Amalfi's present plan was not going to work.

And again the rock upon which it was sure to founder was Frank Lutz.

Chris did not doubt that Amalfi

could outsmart Lutz hands down in any face-to-face situation, but that was not what this was. He did doubt, and doubted most thoroughly, that any list of trigger-words the City Fathers could prepare could fool Lutz for long, no matter how well they lulled the hundred eyes of Argus to sleep; the city manager of Scranton was educated, shrewd, experienced in the ways of politics and power—and by now, on top of all that, he would be almost insanely suspicious. Suspicion of everyone had been normal for him even in good times; if he suspected his friends when things were going right, he would hardly be more trustful of his enemies in the very last days of a disaster.

Chris knew very little yet about the politics of Okie cities, but he knew his history. Also, he knew skunks; he had often marveled at the obduracy with which poor Kelly had failed to profit by his tangles with them. Maybe the dog had liked them; they are affectionate pets for a cautious master. But the human variety was not worth the risk. One look at Frank Lutz had taught Chris that.

And even supposing that Lutz did not shoot from the hip while New York was still trying to stall, bringing down upon the city a rain of missiles or whatever other bombardment Scranton was able to mount; even supposing that Lutz was totally taken in by Amalfi's strategy, so that New York took

his city away from him at the very last minute, without firing a shot or losing a man; even supposing all this—and it was an impossible budget of suppositions—Piggy and the two women prisoners would not survive it. In New York only Chris could know with what contempt Lutz treated the useless people aboard his own town; and only Chris could guess what short shrift he would give three putative refugees from a great city that did tolerate passengers.

Piggy's pitiful expedition was probably heaving slag right now. If Lutz allowed them to live, more or less, through the next week, he would certainly have them executed the instant he saw his realm toppling, no matter how fast Amalfi moved upon Scranton when the H-hour arrived—it takes no more than five seconds to order that hostages be sacrificed. That was the whole and only reason why the many wars of medieval Earth had gone on so many years after all the participants had forgotten why they had been started, or if they remembered, no longer cared: there was still ransom money to be made.

His guardian was already impatient of that kind of example, however. As for Amalfi and the City Fathers, they had made their position too clear to be worth appealing to now. Were Chris to go back to them, they would give him more than another "No"; such an approach would give them all the reasons they could possibly need to



put Chris under a twenty-four-hour watch.

Yet this time he *knew* they were wrong; and this time he planned very carefully, fighting off the constant conviction that these ancient men and machines could not possibly have made a mistake . . . and would snap the switch on him at any moment.

If they knew what he was up to, they remained inactive, and kept their own counsel. He trudged out of the city the next night. Nobody

tried to stop him. Nobody even seemed to see him go.

That was exactly what he had hoped for; but it made him feel miserably in the wrong, and on his own.

XI

Ordinarily Chris would not have ventured into a strange wilderness at night; even under present circumstances, he would have left

perhaps an hour before sunrise, leaving himself only enough darkness to put distance between himself and any possible pursuit. But on Argus III, he had several advantages going for him.

One of these was a homing compass, a commonplace Okie object the needle of which always pointed toward the strongest nearby spin-dizzy field. On most planets, cities tended to keep a fractional field going to prevent the local air from mixing with that of the city itself—and when the city was on a war footing, the generators would be kept running as a matter of course, in case a quick getaway should be needed. The gadget would point him away from New York for half his trip, and an ordinary magnetic compass would serve to show which way; thereafter, the homing compass would be pointing steadily toward Scranton.

The second advantage was light. Argus had no moon—but it had the one hundred eyes of the nearby blue-white giant suns of the cluster, and beyond them the diffuse light of the rest of the cluster, throughout this half of the year. The aggregate sky-glow was almost twice as bright as Earthly moonlight—more than good enough to read by, and to cast sharp shadows, though not quite enough to trigger the color-sensitivity of the human eye.

Most important of all, Chris knew pine woods and mountains. He had grown up among them.

He traveled light, carrying with

him only a small pack containing two tins of field rations, a canteen and a change of clothing. The "fresh" clothes were those he had been wearing when he had first been transferred to New York; it had taken considerable courage to ask the City Fathers if they were still in storage, despite his knowledge that the machines never told what they knew unless asked. The request left behind a clue, but that really didn't matter; once Sergeant Anderson realized Chris was missing, he could be in little doubt about where he had gone.

By dawn he was almost over the crest of the range. By noon he had found himself a cave on the other side from which a small, ice-cold stream issued. He went very cautiously into this, as deep as he could go on his hands and knees, looking for old bones, droppings, bedding or any other sign that some local animal lived here. He found none, as he had expected; few animals care to make a home directly beside running water—it is too damp at night, and it attracts too many potential enemies. Then he ate for the first time, and went to sleep.

He awoke at dusk, refilled his canteen from the stream, and began the long scramble down the other side of the range. The route he took was necessarily more than a little devious, but thanks to the two compasses he was never in any doubt about his bearings for more than a few minutes at a time. Long

before midnight, he caught his first glimpse of Scranton, glowing dully in the valley like a scatter of dew-drops in a spider's web. By dawn, he had buried his pack along with the New York clothes—by now more than a little dirty and torn—and was shambling cheerfully across the cleared perimeter of Scranton, toward the same street by which he had boarded the town willy-nilly so long ago. There were many differences this time, not the least of which was his possession of the necessary device for getting through the edge of the spindizzy field.

He was spotted at once, of course, and two guards came trotting out to meet him, red-eyed and yawning; obviously, it was near the end of their trick.

"Whatcha doin' out here?"

"Want to pick mushrooms," Chris said, with what he hoped was an idiotic grin. "Didn't find any. Funny kind of woods here."

One of the sleepy guards looked him over, but apparently saw nothing but the issue clothing and Chris' obvious youth. He cursed Chris out and said:

"Where ya work?"

"Soaking pits."

The two guards exchanged glances. The soaking pits were deep, electrically heated holes in which steel ingots were cooled, gently and slowly. Occasionally they had to be cleaned, but it wasn't economical to turn the heat off. The men who did the job were lowered into the pits in asbestos

suits for four minutes at a time, which was the period it took for their insulating wooden shoes to burst into flame; then they were hauled out, given new shoes, and lowered into the pit again—and this went on for a full working day. Nobody but the mentally deficient could safely be assigned to such an inferno.

"Awright, feeb, get back on the job. And don't come out here no more, get me? You're lucky we didn't shoot you."

Chris ducked his head, grinned, and ran. A minute later he was twisting and dodging through the shabby streets. Despite his confidence, he was a little surprised at how well he remembered them.

The hidey-hole among the crates was still there, too, exactly as he and Fred had last left it, even to the stub of candle. Chris ate his other tin of field rations, and sat down in the darkness to wait.

He did not have to wait long, though the time *seemed* endless. About an hour after the end of the work day, he heard the sounds of someone threading the labyrinth with sure steps; and then the light of the flash came darting in.

"Hi, Frad," he said. "I'm glad to see you. Or I will be, once you get that light out of my eyes."

The spoor of the flashlight beam swung toward the ceiling. "Is that you, Chris?" Frad's voice said. "Yep, I see it is. But you must have grown a foot."

"I guess I have. I'm sorry I didn't get here sooner."

The big man sat down with a grunt. "Never thought you'd make it at all—it was just a hunch, once I heard who it was we were up against. I hope you're not trying to switch sides, like those other three idiots."

"Are they still alive?" Chris said with sudden fear.

"Yep. As of an hour ago. But I wouldn't put any money on them lasting. Frank is getting wilder by the day—I used to think I understood him, but not any more. Is that what you're here for—to try and sneak those kids out? You can't do it."

"No," Chris said. "Or anyhow, not exactly. And I'm not trying to switch sides, either. But we were wondering why you let your city manager get you into this mess. Our City Fathers say he's gone off his rocker, and if the machines can see it, you ought to be able to. In fact, you just said you did."

"I've heard about those machines of yours," Frad said slowly. "Do they really run the city like the stories say?"

"They run most of it. They don't boss it, though: the Mayor does that."

"Amalfi. Hm-m-m. To tell you the truth, Chris, everybody knows that Frank's lost control. But there's nothing we can do about it. Suppose we threw him out—not that it'd be easy—where'd we go

from there? We'd still be in the same mess."

"You wouldn't be at war with my town any more," Chris suggested.

"No, and that'd be a gain, as far as it went. But we'd still be in the rest of the hole. Just changing a set of names won't put any money in the till, or any bread in our mouths." He paused for a moment and then added bitterly, "I suppose you know we're starving. Not me, personally—Frank feeds his own—but I don't eat very well either when I have to look at the faces I meet on the streets. Frank's big play against Amalfi is crazy, sure—but except for that we've got *no* hope."

Chris was silent. It was what he had expected to find, but that made the problem no easier.

"But you haven't answered my question," Frad said. "What are you up to? Just collecting information? Maybe I should have kept my mouth shut."

"I'm trying to promote a revolution," Chris said. It sounded embarrassingly pompous, but he couldn't think of any other way to put it. He was also trying to avoid saying anything which would be an outright lie, but from this point onward that was going to be increasingly difficult. "The Mayor says you must have flunked your contracts because you don't have any machines to judge them. Evidently that happens a lot of times to small cities that don't have computer control. And the City Fathers

say you *could* have done this job."

"Now wait a minute. Let's take this one step at a time. Suppose we got rid of Frank and patched things up with Amalfi. Could we get some help from your City Fathers on re-organizing the job?"

Now the guesswork had to begin, to be followed rapidly by the outright lying. "Sure you could. But we'd have to have our people back first—Piggy Kingston-Throop and the two women."

Frad made a quick gesture of dismissal in the dim light. "I'd do that for a starter, not as part of a deal. But look, Chris, this is a complicated business. Your city landed here to do the job we defaulted on. If we do it after all, then somebody doesn't get paid. Not a likely deal for Amalfi to make."

"Mayor Amalfi isn't offering any deal yet. But Frad, you know what our contract with Argus is like. Half of it is to do the job you didn't do, sure. But the other half of it is to get rid of Scranton. If you turn into a decent town instead of a bindlestiff, we'll get that part of the money—and it's the bigger part, now. Naturally the Mayor'd rather do it by *finagling* than by fighting—if we fight, we'll need all the money and more just to pay for the damages, both of us. Isn't that logical?"

"Hm-m-m. I guess it is. But if you want to keep *me* reasonable, you'd better lay off that word 'bindlestiff'. It's true enough, but it makes me mad all the same. Either

we treat as equals, or we don't treat."

"I'm sorry," Chris said. "I don't know a lot about this kind of thing. The Mayor would have sent somebody else if he'd had anybody who could have gotten in. But there wasn't anyone but me."

"O.K. I'm edgy, that's all. But there's one thing more, and that's the colonists. They're not going to trust us just because we've gotten rid of Frank. *They* don't know that he's the problem, and they'll have no better reason to trust the next city manager. If we're going to get back the mining part of the contract, Amalfi will have to guarantee it. Would he do that?"

Chris was already in far deeper waters than his conscience could possibly justify. He knew abruptly that he could push no farther into the untrue and the unknown.

"I don't know, Frad. I never asked, and he didn't say. I suppose he'd have to ask the City Fathers for an opinion first—and *nobody* knows what they might say."

Frad squatted and thought about it, smacking one fist repeatedly into the other palm. After a moment, he seemed about to ask another question, but it never got out.

"Well," he muttered finally, "every deal has one carrot in it. I guess we take the chance. You'll have to stay here, Chris. I can knock Barney's and Huggins' heads together easy enough, but Frank's something else again. When the

shooting really starts, he might turn out to be a lot faster than I am—and besides, he won't care what else he hits. If I manage to dump him I'll come back for you soon enough—but you'd better stay out of sight until it's over."

Chris had expected nothing else, but the prospect of again missing all the excitement, while he simply sat and waited, disappointed him all the same. However, it also reminded him of something.

"I'll stay here. But Frad, if it doesn't look like it's working, don't wait till it's hopeless. Let me know and I'll try to get help."

"Well . . . all right. But better not to have any outsiders visible if it's going to stick. If anybody in this town sees New York's finger in this, even people who hate Frank'll be on his side again. We're all a little crazy around here lately."

He stood up, his face somber, and picked up the flashlight.

"I hope you've got the straight goods," he said. "I don't like to do this. Frank trusts me—I guess I'm the last man he does trust. And for some reason I always like him, even though I knew he was a louse from the very beginning. Some guys hit you that way. It's not going to be fun, stabbing him in the back. He's got it coming, sure—but all the same I wouldn't do it if I didn't trust you more."

He swung to the exit into the labyrinth. Chris swallowed and said: "Thanks, Frad. Good luck."

"Sit tight. I'll see you."

Of necessity, Chris did not stay in the hole every minute of the day, but even so he found that he quickly lost track of the passage of time. He ate when he seemed to need to—though most of the food had been removed from the hideout; Frad had missed one compact cache—and slept as much as possible. That was not very much, however, for now that he was inactive he found himself a prey to more and more anxiety and tension, made worse by his total ignorance of what was going on outside.

Finally he was convinced that the deadline had passed. After this, all possibility of sleep vanished; from minute to minute he awaited the noises of battle joined, or the deepening dron which would mean that Scranton was carrying him off again. The close confines of the hole made the tension even more nightmarish. At the first faint sound in the labyrinth, he jumped convulsively, and would have started like a hare had there been any place to run to.

In the uncertain light of the flash, Frad looked ghastly: he had several days' growth of beard and was haggard with sleeplessness. In addition, he had a beautiful black eye.

"Come on out," he said tersely. "The job's mostly done."

Chris followed Frad out into the half-light of the warehouse, which seemed brilliant after the stuffy inkness of the hole, and thence into

the intolerable brilliance of afternoon sunlight.

"What happened to Frank Lutz?" he said breathlessly.

Frad stared straight ahead, and when he replied, his voice was totally devoid of expression.

"We got rid of him. The subject is closed."

Chris shielded off from it hastily. "What happens now?"

"There's still a little mopping up to do, and we could use some help. If you called your friends now, we could let them in—as long as Amalfi doesn't send a whole boarding squad."

"No, just two men."

Frad nodded. "Two good men in full armor should flatten things out in a day or so at the most." He hailed a passing Tin Cab. As it settled obediently beside them, Chris saw that there were several inarguable bullet-holes in it. How old they were was, of course, impossible to know, but it was Chris' guess that they hadn't been there for as much as a week. "I'll get you to the radio and you can take it from there. Then it'll be time to get the deal drawn up."

And that would be the moment that Chris had been dreading above all others—the moment when he would have to talk to Anderson and Amalfi, and tell them what he had done, what he had started, what he had committed them to.

There was no doubt in his mind as to how he felt about it. He was scared.

"Come on, hop in," Frad said. "What are you waiting for?"

XII

The city was still administered, with due regard for tradition, from City Hall, but its control room was in the mast of the Empire State Building. It was here that Amalfi received them all—Chris, Frad, and Sergeants Anderson and Dulaney—for he had been occupying it around the clock while the alert had been on, as officially it still was.

It was a marvelous place, jammed to the ceilings with screens, lights, meters, automatic charts, and scores of devices Chris could not even put a name to; but Chris was more interested in the Mayor. Since he was at the moment talking to Frad, Chris had plenty of opportunity to study him.

The fabulous Amalfi had turned out to be a complete surprise. Chris could not say any more just what kind of man he had pictured in his mind. Something more stalwart, lean and conventionally heroic, perhaps—but certainly not a short barrel-shaped man with a bull neck, a totally bald head and hands so huge that they looked as though they could crush rocks. The oddest touch of all was the cigar, held in the powerful fingers with almost feminine delicacy, and drawn on with invariable relish. Nobody else in the city smoked—*nobody* else—because there was no place in it to

grow tobacco. The cigar, then, was more than a badge of office; it was a symbol of the wealth of the city, like the snow imported from the mountains by the Roman emperors, and Amalfi treated it like a treasure, not a habit. When he was thinking, he had an odd way of holding it up and looking at it, as though everything that was going on in his head was concentrated in its glowing coal.

He was saying to Fred: "The arrangement with the machinery is cumbersome, but not difficult in principle. We can lend you our Brood assembly until she replicates herself; then you reset the daughter machine, feed her scrap, and out come City Fathers to the number that you'll need—probably about a third as many as we carry, and it'll take maybe ten years. You can use the time feeding them data, because in the beginning they'll be idiots except for the computation function.

"In the meantime we'll refigure your job problem on our own machines. Since we'll trust the answer, and since Chris says you're a man of your word, that means that of course we'll underwrite your contract with the Agridae."

"Many thanks," Fred said.

"Not necessary," Amalfi rumbled. "For value received. In fact we got more than we're paying for—we learned something from you. Which brings us to our drastic friend Mr. deFord." He swung on Chris, who tried unsuccessfully to swallow his heart. "I suppose

you're aware, Chris, that this is D-day for you: your eighteenth birthday."

"Yes, sir. I sure am."

"Well, I've got a job for you if you want it. I've been studying it ever since it was first mentioned to me, and all I can say is, it serves you right."

Chris swallowed again. The Mayor studied the cigar judiciously.

"It calls for a very odd combination of skills and character traits. Taking the latter first, it needs initiative, boldness, imagination, a willingness to improvise and take short-cuts, and an ability to see the whole of a complex situation at a glance. But at the same time, it needs conservative instincts, so that even the boldest ideas and acts tend to be those that save men, materials, time, money. What class of jobs does that make you think of so far?"

"MILITARY GENERAL OFFICERS," the City Fathers announced.

"I wasn't talking to you," Amalfi growled. He was plainly irritated, but it seemed to Chris an old irritation, almost a routine one. "Chris?"

"Well, sir, they're right of course. I might even have thought of it myself, though I can't swear to it. At least all the great generals follow that pattern."

"O.K. As for the skills, a lot of them are required, but only one is cardinal. The man has got to be a first-class cultural morphologist."

Chris recognized the term, from

his force-feeding in Spengler. It denoted a scholar who could look at any culture at any stage in its development, relate it to all other cultures at similar stages, and come up with specific predictions of how these people would react to a given proposal or event. It surely wouldn't be a skill a general would ever be likely to have a use for.

"You've got the character traits, that's plain to see—including the predisposition toward the skill. Most Okies have that, but in nowhere near the degree you seem to. The skill itself, of course, can only emerge with time and practice

"As for the city, we never had such a job on the roster before, but a study of Scranton and some more successful towns convinces us that we need it. Will you take it?"

Chris' head was whirling with a wild, humming mixture of pride and bafflement. "Excuse me, Mr. Mayor—but just what *is* it?"

"City manager."

Chris stared at Sergeant Anderson, but his guardian looked as stunned as Chris felt. After a moment, however, he winked solemnly. Chris could not speak; but at last he managed to nod his head. It was all the management he was capable of, right now.

"Good. The City Fathers predicted you would, so you were started on the drugs in your first meal of today. Welcome to citizenship, Mr. deFord."

Even at this moment, however, a part of Chris' mind seemed curi-

ously detached. He was thinking of the original reason he had wanted long life: in the hope that some day, somehow, he might yet get back home. It had never occurred to him that by the time that happened, there would be nothing left back there that he could call his own. Even now, Earth was unthinkableably remote, not only in space, but in his heart.

His definition of "home" had changed. He had won long life; but with it, new ties and new obligations; not an eternal childhood on Earth, but a life for the stars.

He wrenched his attention back to the control room. "What about Piggy?" he said curiously. "I talked to him on the way back. He seems to have learned a lot."

"Too late," Amalfi said, his voice inflexibly stern. "He wrote his own ticket. It's a passenger ticket. He's got boldness and initiative, all right—all of it of the wrong kind, totally untempered by judgment or imagination. The same kind of pitfall will always lie ahead of you, Chris; that, too, is an aspect of the job. It'd be wise not to forget it."

Chris nodded again, but the warning could not dampen his spirits now; for this was for some reason the highest moment of them all—the moment when Frad Haskins, the new city manager of Scranton, shook his hand and said huskily:

"Colleague, let's talk business."

the Reference Library

P. Schuyler Miller

DATED CLASSICS

■ The label "classic" is pretty loosely used in most circles, including our own. It is applied with equal fervor to stories like Edgar Rice Burroughs' "Barsoom" books which readers like and remember with total disregard for the opinion of the critics, and to others which are hailed by the literary cartographers as landmarks of literature, but which nobody reads any more. Burroughs is really in a class by himself—the first three titles in Canaveral Press' reprint series have just come in—and I hope to sound off on the subject next month. But four other "classics" have also arrived which span

just about the entire range from famous but purely a curiosity to modern readers, to a memorable classic of science fiction which is perhaps no great shakes in a literary sense, and which is seeing hard covers for the first time.

The really classic "classic" is "Voyages to the Moon and the Sun," by Cyrano de Bergerac—he was a real person, big nose and all, in case you didn't know—in a new, unexpurgated translation by Richard Aldington, and with an introduction by the translator that is as interesting as Cyrano's own work. It comes from The Orion Press of New York, has 303 pages with several illustrations from old woodcuts and engravings, and costs \$6.00. Only a completist or antiquarian—I am both—will buy it for a science-fiction library, yet for its day it *was* science fiction.

Let me attempt to justify this statement, which rams squarely into the middle of Damon Knight's recent ukase, in the introduction to his choice of classics, "A Century of Science Fiction," that the stuff couldn't exist before the Nineteenth Century. By his definition, he is perfectly right—and Cyrano's "Voyages" are more than three hundred years old. His "Voyage to

the Moon" was published in 1657, after his death, although manuscript versions seem to have circulated for some years before; it may have been written as early as 1648. Its sequel, "The Voyage to the Sun," was begun after the death of Descartes in 1650 and also appeared for the first time in 1657. Manuscripts of the "Moon" survived, and Aldington has used them for this first complete English translation; the "Sun" manuscripts, however, have been lost, and that part of the book comes from the heavily expurgated 1657 edition.

The two books are fantastic satires—"voyages" in the sense Jules Verne used the term two centuries later—in which Cyrano pretends to be describing his own experiences on the Moon and Sun in order to ridicule the social system, religious dogma, and philosophical ideas of his day. He was not advancing any special utopian systems; he is playing the game which science fiction has played ever since, of seeing mankind from "outside," as other species might see us. The religious criticism, incidentally, is what his friend and posthumous editor removed—with perhaps international clumsiness—from the published editions. One can imagine that Cy-

rano's friends among the social and intellectual upper crust of Paris, who had read both books in manuscript, passed knowing remarks about what had been deleted or bowdlerized.

But, as Aldington points out in his introduction, Cyrano was also engaged in the good Gernsbackian practice of putting into fictional form some of what he knew or thought about the science of his time. When the "Voyage to the Moon" was circulating in manuscript through the pubs of Paris, Galileo had only just died, after recanting his heretical contention that the Earth moved around the Sun. Yet Cyrano, who was a crony and pupil of the French philosopher-scientist-mathematician Gassendi, has himself in the opening chapters of the "Moon" expounding proofs of the Galilean heresy to the garrison at Quebec. He had proof positive of its correctness: he had ascended into the atmosphere, the planet had rotated under him, and when he came down he was in new France.

The science of Cyrano's time was inextricably interwoven with its philosophy, and logic chopping counted for more than experiment.

It still carried the alchemical concepts and terminology, and it would have been interesting to see what a historian of Seventeenth Century science could make of Cyrano's concepts and involved explanations. Only some such study would show whether he was parroting the orthodox science of his time or using fiction to advance some of the more daring concepts. His discussion of the "elements" of that time—earth, water, air and fire—sounds very much like a groping toward the solid, liquid and gaseous states of matter, which has now also become quadruple with the plasma state as a kind of Twentieth Century "fire."

Philosophy also had to take into account the religious dogma of the day, and here Cyrano evidently dared to be more daring. He found the Garden of Eden on the Moon, along with a number of earthly prophets—it was Elijah who ascended there in a chariot of polished iron by tossing up a lodestone and letting the chariot be attracted to it. There was a race of beastmen who considered that anything running on only two feet must be quite inhuman, and made a pet of him. Rescue came with the aid of a roving "demon" from the Sun, who had the convenient ability—not unknown to modern science fiction—of being able to animate various bodies. Meanwhile, however, he had talked himself into trouble by insisting that the Earth—the moon of the Lunarians—was actually a

world like their own.

In Cyrano's day there was no reason to suppose that the atmosphere did not extend throughout the universe. Brian Aldiss' "Hot-house" stories seem to suggest a time when it would reach at least to the Moon again. At any rate, after having been charged with sorcery and driven to some scampering about that recall the Ritz Brothers' version of "The Three Musketeers," Cyrano found it expedient to take off for the Sun. This yarn was never finished, or if finished is fragmentary; he experiences a number of remarkable things, expounds and is expounded at; goes on trial in a court of birds for the crime of being a man, naps in a grove of talking trees where he gets the "inside story" of a series of scandals from Greek and Roman mythology, watches a battle of monsters that would do credit to Hollywood, and is on his way to the country of the philosophers when the book ends. He never does re-encounter his old friend, Socrates' demon, or his people.

These satires, allegories, and paradoxical reflections of human foibles are, of course, no prerogative of science fiction. They are a part of most or all religious gospels and have their place in fairy tales and myths. But Cyrano wrote in a modern mood, using what he thought of as the science of his time as a weapon every bit as sharp as his rapier, and if his science wasn't our science, why deny

him a retrospective "Hugo?"

Jules Verne, on the other hand, is quite safely within the accepted gateway to science fiction—even to "modern" science fiction. He still employed the long passages of explanation and description to set the technological scene for his stories, but he is always concerned more with technology than with the brand of contemplative, theoretical science which Cyrano, two centuries before, called "philosophy." The editor of the new Fitzroy Edition—which I find it easier to get from Gnome Press in Hicksville, New York, than from the American publishers, Associated Booksellers of Westport, Connecticut—has eliminated most of these sections from the books. This gives me a feeling of being cheated, and to my taste keeps the new edition from being definitive.

"For the Flag"—192 pages; \$3.00—is the little-known story, which, with embellishments, formed the skeleton of the delightful Czech movie released last year, "The Wonderful World of Jules Verne." This got into the finals for best dramatic work of the year, and richly deserves a "Hugo" but probably won't get it. Most people—myself included—had no idea that Verne had done another submarine book after his stories of Captain Nemo, but in this yarn of a mad inventor who has a super-explosive locked up in his brain, the villain has one sub and the

British Navy sends another to the rescue. Evil, alas, triumphs—at this stage, at least. The villain in question is an Indonesian pirate, Ker Karraje—and didn't Captain Nemo originate in those parts?—who turns up as Count d'Artigas and kidnaps the mad inventor and his keeper, an incognito engineer, from the North Carolina health resort where the man is kept locked up. Thomas Roch simply wants more for his Fulgurator than any government of the world wants to pay—but money is no concern to a pirate, and soon Roch is happily making Fulgurators in a pseudo-crater in the Bermudas, while the keeper-narrator, Simon Hart, is trying to get help. The Fulgurator, by the way, is by no means an atomic bomb, all rumors—and the film—to the contrary. It is a chemical explosive, employed in a remarkable kind of boomerang-rocket that circles around and hits its target from behind. I. O. Evans, the editor, discusses it quite thoroughly in an epilogue.

All the ingredients of mild present-day science fiction are supplied in "For the Flag." The same cannot be said for the second Verne book, "Black Diamonds"—this time 190 pages for \$3.00. Previous English editions have named the book for its heroine, "Child of the Cavern" or "The Underground City;" Evans has given it its proper hero, the Scottish coal-mining industry of the early Nineteenth Century. The plot outline is slender indeed. A

Scottish mine has run out of coal and has been abandoned, except for an old "overman"—foreman or overseer—and his family, who live in the depths of the empty mine and devote their lives to looking for the vanished seam. They find it—after a narrow escape from death—and a subterranean village is founded. Meanwhile a series of mysteries, growing increasingly ominous, begin to plague them. A young girl who has spent all her life in the depths of the "new" mine is found, protected by a weird winged monster. There are catastrophes and sabotage, and in the end the evil spirit of the mine appears for a showdown.

For all its plotwise mildness, the book is one of Verne's best. Details of the mining technology of a century and more ago are fascinating, and should be as novel to modern readers as they seem to have been to Verne. The "man engine" used to get miners in and out of the shafts, in the days before cable-run hoists, is a truly amazing application of mechanics. The role of the "monk" or "fireman," whose job it was to find and explode small pockets of fire damp—methane—before the Davy safety lamps were invented, is another bizarre element. Incidentally, Verne seems to have been the victim of some mine owners' propaganda when he insists again and again on the healthfulness of living an entire lifetime underground, at a uniform temperature, never exposed to the inequi-

ties of storm or cold. The miners might have had other views.

Fourth of the new books is "Armageddon 2419 A.D." by Philip Francis Nowlan—Avalon Books, 224 pages, \$2.95—which for some inexplicable reason has not seen book publication since 1927, when the first of the two stories combined in this book appeared in *Amazing Stories*. Afficionados will recognize them as the original "Buck" Rogers stories, from which the cartoon strip originated; the latter pretty well set the stereotype for space-opera in the cartoon field, but Tony Rogers never got into space until he left the printed page. *Amazing Stories* reprinted the stories in its anniversary issue of April 1961 and in May of this year.

Anthony Rogers, as you may know, was a veteran of World War I who was trapped by a rock-fall in one of the abandoned hard-coal mines in the Wyoming Valley of Pennsylvania—the Scranton-Wilkes-Barre area—in 1927. He was preserved by radioactive gases, and recovered in 2419 A.D., when America had been overrun by the Air Lord of Han, a presumably Chinese super-race who appeared from inner Asia and reduced the American people to scattered forest tribes, one of them the Wyomings. These people, among whom Rogers soon assumes leadership because of his military experience, have one of those paradoxical technologies

which combine a very simple, almost subsistence economy with antigravity, synthetic elements, and a knowledge of physics that goes two "levels" below our present "elementary" particles. When these stories were written, incidentally, the elementary particles stopped with the electron and proton; positrons were purely a theory, and neutrons were yet to be discovered.

In the first story Tony Rogers and the Wyoming Gang lead a successful revolt against the nearest Han citadel. In the second, Tony is taken prisoner and sees the Han society from inside before he is rescued and the power of the Air Lords is crushed.

"Armageddon 2419" appeared in the same issue of *Amazing* with Dr. E. E. Smith's opening sample of "The Skylark of Space." "Doc" Smith and Philip Francis Nowlan were probably the first important science-fiction writers developed or discovered by Hugo Gernsback in this era of adolescent SF, and Nowlan unfortunately stopped after two stories—at least, for many years. He was not content to introduce a new gadget and rhapsodize over the fact like a hen cackling over her first egg; he *used* his gadgets—bazookas, walkie-talkies; snooper scopes, rocket belts, as we know them now—calmly and matter-of-factly. These were things people had in the Twenty-fifth Century; they were new to Rogers, but he took them in stride and quickly learned to make very good

use of them. Nowlan, I am sure, would have done the same if he had not let the cartoon strip take all his time until shortly before his death in 1940. It is too bad that this particular classic had to wait until after its author's death to appear in hard covers, when so much poorer stuff by other writers did so while he was alive.

NECROMANCER, by Gordon R. Dickson. Doubleday & Co., Garden City, N. Y. 1962. 191 pp. \$2.95

If this puzzling book had appeared twenty years ago—when Gordon Dickson was in no position to write it—it might have stolen the thunder from Van Vogt's "World of Null A." It is the same kind of superman story, with the puzzled hero involved in a cosmic tangle wherein wheels move within wheels within wheels, and several of the crucial gears have missing teeth that must be found and replaced. However, the concept on which the webwork is hung—the author's own variant of Heisenberg's uncertainty principle—makes better sense, or is at least more plausible, than General Semantics.

Paul Formain is a mining engineer who may or may not have died once, before the story begins. Through carelessness or daydreaming—or something else—he loses an arm in a mine accident; the remaining arm develops amazingly to compensate. Then Formain gets wind of an organization, the Chantry Guild, that promises to help him grow himself a new arm . . .

and the wheels start whirring like mad.

As in any good Van Vogtian plot, things happen too fast and too much information is withheld from the hero and the reader for either to tell what is going on. Maybe someone with more savvy than I can keep up or get a little ahead, but it's easier to hang on and gasp at the dips and turns. The Chantry Guild is dedicated to the use of the so-called Alternate Laws—which make seeming magic commonplace—to crush the Earth's technological civilization. They reason that this has become self-sustaining: the Machine is manipulating Man for its own comfort and benefit, and they want him to regain his status and power. To do this, they must fight both the Machine and its servants and overthrow the "we never had it so good" philosophy.

Mysterious characters come and go, appear on-stage and go through a bit of elaborate ritual, then vanish for a while. As in a Van Vogtian tangle, you have to wait till the end to find out what it all means—and I am convinced that Gordon Dickson ties them up, or off, more efficiently than Van Vogt ever did in his saga of Gosseyn. Still—perhaps because we are now twenty years older and more calloused to the format—"Necromancer" doesn't seem to move with quite the headlong speed of "Null A," the half-revealed secrets of the cosmos don't seem quite so portentous, and Paul Formain is never quite the

superman that Gosseyn was.

TALENTS, INCORPORATED, by Murray Leinster. Avon Books, N. Y. No. G-1120. 1962. 159 pp. 50¢

Praise be that we still have Murray Leinster to write enjoyable action yarns about the galactic future—yarns that make sense and, as a bonus, involve some of the universals of human behavior. The episodes in this book sound as if they had been written as a series. However, my memory being what it isn't, and the two infallible sources of such data—Ed Wood and Norm Metcalfe—being far, far from Pittsburgh, I'll let the matter drop. Paperback publishers, as you know, no longer bother to give original magazine credits.

This is another story of what I have called the author's "landing grid" universe—the same far-future setting of a colonized Galaxy in which he set his Med Service and "Colonial Survey" stories. The hero is Captain Bors, whose own world, Tralee, had been swallowed up ten years before by the expanding empire of Mekin. Now a Mekinese fleet is on its way to accept the surrender of Kandara, whose ruler and small space navy intend to go down fighting while an interim regime transacts the inevitable surrender. But the yacht *Sylva* shows up with the strange outfit that calls itself Talents, Incorporated . . . and the fun begins.

Talents is exactly what the name implies: a pickup lot of men and women with peculiar psi talents.

One can tell when space ships will reach any locality where he may be at the moment. Another has an odd kind of precognition of possible events. There is a lightning calculator—who has to be given something to calculate before he can function. There is another man with a talent for predicting dirty tricks . . . another who can locate individuals anywhere in the universe . . . another for spreading rumors by telepathy Morgan, ringmaster of this assortment, has made all the money he needs exploiting their talents and has now set out to use them more constructively—in this case, to help Kandar against Mekin Bor, more of a pragmatist than King Humphrey and less bound by protocol than the military hierarchy, joins forces with Talents, Inc.—and the downfall of Mekin is a true joy to behold!

OUTPOST ON THE MOON, by Hugh Walters. Criterion Books, New York. 1962. 191 pp. \$3.50

Here is the fourth in the series of stories for teen-age readers by an English writer who is also an engineering executive. The fifth book, in which Chris Godfrey and his friends go to Venus, is already out in England and will probably arrive in the United States next winter or spring.

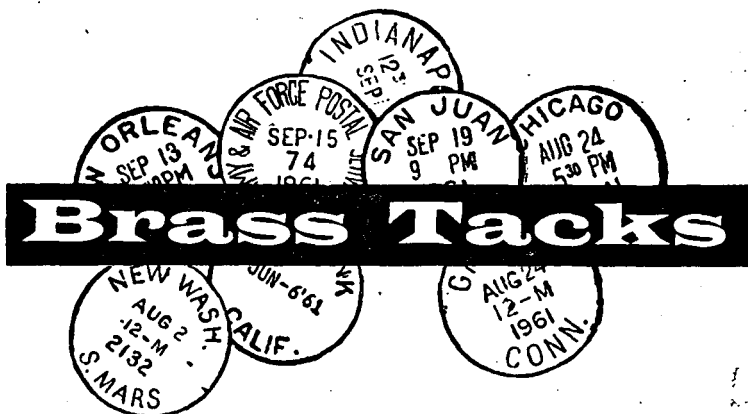
You'll remember that Chris Godfrey is something of a runt, who,

because of his small size and talent for science, is picked to be the first British astronaut. Meanwhile a mysterious menace has shown up on the Moon, bombarding the Earth with strange radiation. In the previous book, Godfrey went to the Moon to help guide a fleet of missiles to the domes where the Menace hangs out. He nearly succumbed to a strange mist, and to the rivalry of a brainwashed Soviet youngster sent to beat him or kill him. Finally, saving each other, the two came back together in the British rocket.

This time Godfrey, Serge Smylov, and an American—Morrey Kant—are to go back in an international attempt to establish a permanent base on the Moon. They take along a slum youngster, Tony Hale, who may be cured by the lunar radiation—the doubletalk here gets pretty involved—and of course they go right back to the spot in Plato where any survivor of the bombed-out Menace will be waiting for them. It is. Tony, also predictably, acts like a lower-class nothing but rises to a later occasion.

The only really interesting character in the series, these days, is Sir Leo Frayling, a stereotype of the cold-blooded, ruthless scientist who will doubtless some day be unmasked as a robot or the Master of the Moon Menace himself.





Dear Mr. Campbell:

Having now read Dr. Davis' very inspiring "Fourth Law of Motion," I feel compelled to rectify my remiss in failure to answer your letter, and add to your arguments one that is catastrophic for all analytical investigation.

This concerns "Gödel's proof," a mathematical accomplishment sitting at the very apex of intellectual endeavor.

There exists, in general, a climate of opinion within which it is tacitly assumed that each sector of mathematical thought is capable of representation by a set of axioms, and that from these axioms may be systematically deduced the endless totality of true propositions within the area of inquiry.

"Gödel's proof" demonstrates the untenability of this assumption by presenting an inescapable argument with the astounding and dismal conclusion that there exist

"facts" as a consequent of the axioms that may not be deduced from the axioms. "Goldbach's theorem," which must suffice as an example, states that, "Every even number is the sum of two primes." This is a "truth" of and about numbers existing as a consequent of the definition of number, and which may not be deduced from the axioms of the theory of number . . .

Now, if we note that physics is an axiomatic discipline, then we come to the realization that there are truths within physics, that while being consequences of the axioms, are not deductable from the axioms, and further, that the number of such truths are infinite. That is to say, there is a class of truths undiscoverable analytically, but which may be found only by happy accident or observation! (Fortunately there are some among us who realize this.)

But "Gödel's proof" goes on to say that if we enlarge our axiomatic system so as to permit the deduction

of the aforementioned undiscoverable truth, that we will generate a new system containing even more undiscoverable truth, thereby ruling out the possibility that even ordinary arithmetic can be fully axiomatized, much less physics, et cetera.

At any rate, since antecedent is insufficient for the analytical establishment of many further consequences we seem guaranteed that the future is full of exciting and still unguessed discovery and invention, many of which will not seem to be rational—whatever that is!

Before closing, I would like to add that through Dr. Davis' theorem, I have been able to design in complete detail a "Solid State" analog of the Dean drive, the geometry of which is much too involved to be given in this short letter.—Paul Defibau, 1424 Polk Street, San Francisco, California.

1. *If you can prove it—that doesn't make it true.*
2. *If you can't prove it—that doesn't mean it's false!*

» » »

Dear John:

I have always taken a dim view of the Dean Drive, and nothing that Dr. Davis says gives me any reason for changing my mind. Putting a rate of change of acceleration term in the equations of motion doesn't mean that it belongs there. Dr. Davis cites no clear, quantita-

tive experimental evidence to show that his equation is valid. In fact he doesn't even give a value for his constant D . As he says, a "reactionless" drive would strongly tend to confirm his ideas, but so far there's no convincing evidence of a reactionless drive. There is a lot of evidence that Newton's laws are correct.

There are a lot of reasons for distrusting Dr. Davis' work. Assuming that Newton's laws are correct, the center of gravity of a rod starts to move immediately on the application of a force to the end of the rod, contrary to Dr. Davis' assertion. The wave in the rod is merely the mechanism by means of which the center of gravity moves. How could Dr. Davis be so careless? Does he believe that the center of gravity is rigidly attached to some atom halfway down the rod, and can't move unless that particular atom moves? Then, why should Colonel Stapp have assumed that the force in a complicated system is equal to the mass of some object in it times the acceleration of the car carrying the system? This surely isn't what Newton's laws say. They say that the force on an object is the mass times the acceleration of the object. If the object is loosely attached to the car, its acceleration may be very different from that of the car. And, Newton did not, as Dr. Davis asserts, consider only systems in which either velocity or acceleration was constant. In view of this

sort of carelessness, I wouldn't be surprised if Dr. Davis' errors extended to other portions of his article.

There is still, of course, the matter of gravitational waves, which most physicists believe in. Perhaps such waves do give rise to a small rate of change of acceleration term in the equation of motion, electromagnetic waves give rise to such a term in the equation of motion of an electron. But, how small such a term would have to be! V. Fok, a Russian physicist says: "This estimate completely confirms the conclusion at the end of Section 88 that in the problem of gravitational interaction of heavy bodies, gravitational waves play no part at all."

We may note that gravitational waves have never been detected and that (according to Einstein's theory) an accelerated body radiates such weak gravitational waves that their detection seems to be beyond our most sensitive devices.

The Titan guidance people will be surprised by the statement in the caption of Figure 2 that performance figures don't check Newtonian formulas accurately.

Now, John, I'd like to turn to your editorial.

Scientists predicted the time the Russians would have the atom bomb to less than a year, not with a five year error.

I don't believe that young Americans are turning away from Science; it's only you who are.

I don't find such vintage ideas as

telepathy, telekinesis and the rest of the psi racket very exciting any more. I certainly don't get excited about alleged space drives that don't work or alleged equations of motion that aren't so. For me the startling things that are accomplished and do work are just too much competition for such dull old trash.

Among accomplishments of the last decade or so I'd list:

The transistor, and the whole field of solid state physics that was opened up by the discovery that holes and electrons can exist in a semiconductor simultaneously.

The microwave maser, which oscillates with exceeding precision and in amplifying, adds almost no noise

The optical maser, which produces light so intense as to melt holes through thin metal almost instantly. Using light from a maser and radar techniques, we could make a contour map of the moon from the earth!

The Mossbauer effect, a frequency gauge so precise that Einstein's principle of equivalence was demonstrated right here on earth by the red shift of radiation rising or falling a few feet along the gravitational field of the earth.

John, if you weren't so completely blind to the exciting achievements of science, I'll bet you could bring a lot of pleasure to your readers, many of whom are getting pretty tired of the same stale fare year after year.—J. J. Coupling

Perhaps Science should investigate the Mossbauer Effect, too—it produces extremely stable oscillation about the same ideas.

It is not Analog's business to compete with Scientific American in discussing well-established, well-settled areas of Science; our business is the speculative frontier, the newly-explored, still-unmapped areas.

Heat rays and spy rays are sort of old-hat, stale fare in science fiction, aren't they?

However, you seem to be afflicted with the Mossbauer Effect; you are quite carelessly throwing accusations of carelessness, while making flatly dogmatic statements concerning matters which you have—to my direct knowledge—not examined. You may get away with calling Dean an unimportant crackpot not properly deserving a scientist's attention before dismissing him. But your failure to investigate before damning the work of Dr. Davis is clearly emotionalism. Particularly in view of the fact that you did not—or could not—read Dr. Davis article carefully enough to notice that he was NOT discussing the accelerated-mass radiation "gravity waves" Einstein discussed, but an entirely different class of phenomenon involving radiation from a surged mass.

» » »

Dear Mr. Campbell:

Re the discussion of the "We don't wanna look . . ." attitude: May I call your attention to a report entitled "Newton and Spectral

Lines" on page 921 of the 16 March 1962 issue of *Science*. I co-authored the report with Dr. W. H. Dennen, of MIT's Cabot Spectrographic Laboratory, and though we had no intention of tarnishing the name of a scientific demigod, it seemed to me that Newton was victimized by prevailing Royal Society "blindness." His warfare with Robert Hooke was prolonged and bitter, and although Newton seems to have had many supporters, the criticisms must have kept his unstable ego in a constant state of deflation. So, it would seem, a prevalent "don't show me" attitude, coupled with the hypersensitivity of a man whose emotional state bordered on paranoia, delayed the birth of spectroanalysis some one hundred eleven years.—William J. Bisson, 1st Lieutenant U.S.A.F.

Oh, come now! Everybody knows only crackpots get angry when people tell them they are wrong!

» » »

Sir:

I recently read the article on the Fourth Law of Motion, by Dr. William O. Davis.

Most sincere congratulations.

I do not know if you realize right now the scope of that work, but I think it is tremendous. So now, to speak electricity, we will have variable mechanical impedances, mechanical couples rectifiers and so on, he?

I think Dean started something

that will immortalize his name. And by the way, you are right when you think that: "It's quite probable that half a dozen equally . . ."—Yves Samson, P.O. Box 56, Loretteville, Quebec, P.Q., Canada.

The trouble is, was and forever will be finding them!

» » »

Dear Sir:

As a graduate of the INSTITUTE OF HYPNOTHERAPY of Los Angeles and San Antonio, I wish to commend ANALOG on publishing the first fictional works I have seen concerning hypnotism without connecting the subject with superstition, grave-robbing, or Svengali-ism. However, I think you should print a warning to all amateur hypnotists *not* to follow the technique described in "Nor Iron Bars A Cage." One of the most important "don'ts" of Hypnotherapy is: "Never plug an emotional outlet in a subject." An emotion that is plugged will *inevitably* find release, usually in a more repulsive, revolting, or dangerous form of neurosis. Tell a nail-biter while he is under hypnosis that he can no longer bite his nails, and he may go into hysteria. Tell the compulsive eater that he will get more filling satisfaction from fewer calories and he will either resist by eating twice as much, or he will eat less but he may become an alcoholic

or a wild, wild woman chaser. Tell the compulsive speeder that he can no longer drive, and he may find emotional release as a rapist.

The trained hypnotherapist is taught many ways he can be of benefit to his fellows, but he is also taught to leave emotional disturbances to the psychiatrist—If the psychiatrist is modern and progressive, he may possibly cut down time and expense of treatment through hypnoanalysis.

I consider hypnotherapy one of the new frontiers of science, just as was rocketry when I first began reading your magazine. ANALOG is to be congratulated on its courage in sending feelers into this field in the face of opposition it will probably receive from the superstitious and from those who would rather see one die by tried and true methods of treatment than get well by unorthodox means.—Joel Karin, INSTITUTE OF HYPNOTHERAPY, 1403 N. Main Avenue, San Antonio, Texas.

Agreed in full; hypnosis does NOT have the effects described in "Nor Iron Bars a Cage." That's why it was specified as being related rather to Voodoo, magical enchantment, or whatever it was the old-time Magi used, than to modern hypnotism. Hypnosis compels the conscious; what's needed is something that acts compulsively on the subconscious.

(Continued from page 5) constrained by limits reasonable for that place and season—and you can generate a truly random temperature prediction for any given time, day, and season for any named place. It's truly random, just as a throw of a pair of honest dice is, despite the fact that the dice have restraint conditions that make either 1 or 13 impossible.

Using that basic approach, Goodavage has produced a random prediction of the weather for October.

The predictions reached my office on July 6, 1962; because of our slow printing and delivery schedule, we had to have October predictions. So . . . you can check on the results, and see whether random or astrological predictions are more accurate!

One trouble . . . the predictions will appear, to each of you, very vague and indefinite. No "On October 14th, at 3:35 p.m., it will start to rain in the Bronx, but rain won't start until 3:57 in Brooklyn."

Knowing as little as we do about weather, we certainly can't state at such a prediction is absolutely impossible—but we can't do it now, any rate.

More important and immediate—for Analog to publish such a satisfyingly detailed prediction for each of you readers would require a monthly index the size of a set of the *Encyclopedia Britannica*. You live in San Diego and want a prediction . . . but you live in Waterville, Maine, and in Troy, New York and Ohio, and in Springfield, Massachusetts, New Jersey, Connecticut, Illinois, and most of the rest of the states.

The predictions have to be specific for areas—and most of the areas are, inevitably, areas you don't live in, and can't check on. If New York City gets a cold wave October 15th—the usual cold air mass with temperatures around 15 to 20 degrees, say . . . this doesn't make the local papers in Houston, which happens to have been hit just then by an unusually hot and dry wind. So the prediction "cold wave on Oct. 15th" impresses the Houston reader as a one hundred per cent miss, naturally.

The ones to whom this type of prediction is important are the long-haul commercial shippers, airlines, truckers, boat and ship operators, fruit and vegetable marketing people, resort owners, et cetera. They *are* interested in the nation-wide weather patterns.

However—here's a crucial experiment: an astrological forecast laid on the line, side by side with a random forecast. We now plan to run this system for several months—long enough for a reasonable check to see if the astrological forecast exceeds chance as heavily as the astrologers expect . . . or falls as far short as the anti-astrologers "know" it must.

If astrology actually has any claim to validity—weather is certainly the area of highest probability.

That's where it all started!

The Editor.

The United States Weather Bureau, by its own definition, can produce skillful weather forecasts only for periods up to twenty-four hours. "For periods extending to about seventy-two hours, weather forecasts of moderate skill and usefulness are possible . . . beyond three days, skill in day-to-day predictions is small . . . *Average temperature conditions* for periods up to a month can be predicted with *some* skill. Forecasts for periods of more than one month in advance must be considered as *experimental*." *

The USWB is now experimenting with *ninety-day* forecasts; these are no more than educated guesses of average temperatures and precipitation. They are too general and too vague to be useful for comparison.

But the USWB and the American Meteorological Society are rough on the upstarts. One (undeclared) astrologer, whose two-year weather forecast later proved ninety-four per cent accurate, was blasted by the A.M.S.:

"A forecast two years in advance is a scientific impossibility . . . it does meteorology a disservice."

Of course it does—especially when it works.

As for being a "scientific impossibility," this statement needs challenging. So let's do meteorology for ourselves—another "disservice."

Each month for the next several months, Analog will publish Mr. X's forecast, based on his astro-nomic-weather interpretations. We

* *Author's italics*

invite your critical analysis and comment.

ASTRO-WEATHER FOR OCTOBER, 1962

October's weather forecast for the U.S.A. is one of sharp contrasts. While relatively mild weather dominates the Pacific coast, a belt of cold air masses in eastward transit will broaden north of Chicago and St. Louis.

In southeastern states, high relative humidity will predominate the general atmospheric picture, but there will also be above-normal mean temperatures.

October opens with semi-tropical lows, cradled from the Alabama-Georgia-Florida area. These will cause isolated flash rains along the Atlantic coast and amplify over Chesapeake Bay on October 1st and 2nd.

A weather pattern will be set by a northing low which will enter the northern Pacific coast. In the Seattle, Washington—Portland, Oregon area on October 4th, there will be a preview of November's worst weather for mariners and shipping interests. Rising temperatures will precede this storm eastward. It should reach Chicago by October 6th, still preceded by rising temperatures downslope. It will center over the Buffalo-Albany, New York area on October 7th and reach Boston the evening of the 7th or the morning of the 8th. East of Boston it will be unseasonably cold.

Cold fronts following eastward

will result in lowest temperatures over northern New England. Even lower temperatures are in store for Maine on October 8th, with freezes and snow very likely.

From October 7th to 9th, descending, gusty winds of varying velocities are likely to develop around intense highs, one of which will dominate the Pacific coast from October 10th to 12th.

After the 14th of October, a relatively drier trend will extend through the normally wet southern states. Under such a pattern, any atmospheric disturbance will be more acute. On the other hand, cold waves will intensify over the northern states from the Ohio River Valley eastward. From the Delaware Bay eastward, weather will be more variable.

A southing low pressure area stemming from the California coast late on October 16th will travel eastward and center over New Orleans by the 18th, and° Georgia early on the 19th. It will probably generate a complex merging pattern at that point, then swing north along the Atlantic coast to reach New York on the 20th, where it will change character eastward.

At 66° W. longitude, approximately north of Bermuda, this depression will develop acute intensity and powerful wind velocities as cold, dry air masses collide with moist torrid temperatures—a classic weather pattern for unusual turbulence. Shipping schedules, fishing and boating interests, especially

in the southern latitudes, will be upset as the turbulence ensues over October 20th–21st.

This sudden change in pattern will result from unseasonable fall coolness spawning from northern New England—principally Maine—and intensifying over the Grand Banks. Although slightly above seasonal normal temperatures are charted for the southeastern states, generally warmer, drier weather will dominate southern regions from Bermuda eastward.

On October 28th a mass of frigid Canadian air descending over the Dakotas and eastern Montana will drop the mercury and chill northern areas in eastward transit.

Watch for sharply falling mountain temperatures and sliding to minimum temperatures over Duluth, Chicago, Detroit and Pittsburgh as October closes. The pattern will be set for winter's deepest freeze over the Pittsburgh, Pennsylvania area.

THE RANDOM FORECAST

The random weather forecast was prepared by spinning a pointer in the center of three different circles, the first two of which were divided into twelve segments of thirty degrees each. These two were for various weather manifestations and geographic locations, respectively.

The third circle, divided into thirty-one segments of approximately eleven and one half degrees each, represented the date in October.

Thus there were twelve entirely different kinds of weather (excluding volcanic and seismic activity)—twelve general locations in the U.S.A., and thirty-one possible dates for the spinner to choose. It was spun by different people at different times and a record was made of each stop.

This is just one way of choosing a random forecast. There are other methods, any of which you may choose against the predictions of the weather bureau *and* our astrometeorological long-range forecasts:

* * *

The Texas, New Mexico and Arizona area will experience unusually early winter snow and hailstorms in westward transit beginning on October 1st and lasting through October 3rd. South and North Carolina will have clear, cold and dry weather from the 3rd to the 6th, with possible frost at night. High humidity and dense fogs in low-lying areas of Colorado will manifest on the evening of the 8th and morning of the 9th.

Unseasonable downpours will cause flash floods in Dakota and Montana for two consecutive days: October 9th and 10th.

Florida, Alabama and Georgia will have a long siege of fine, drizzling rain from October 9th to 13th. In westward transit, this precipita-

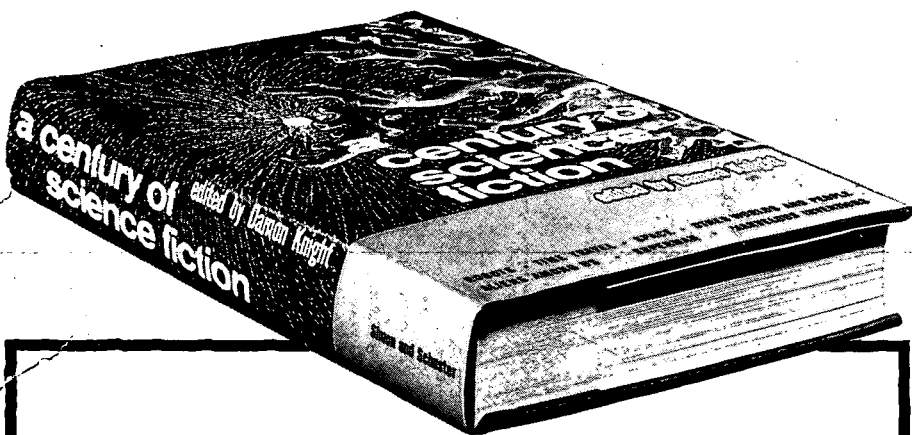
tion will develop into a heavy downpour over the Mississippi Valley and the Gulf States on October 12th, causing flood problems along the levees.

From the 12th to 15th, Fairbanks, Alaska will be enjoying clear and sunny weather and balmy, spring-like breezes.

The southeastern states of Florida, Alabama and Georgia will receive hurricane warnings on October 20th as a new hurricane swings eastward over the Atlantic coastline from the Bahamas. On the 21st, the New England states will experience unusually heavy precipitation; the Canadian border states will have torrential rains. Texas and the Gulf states will have clearing and sunny weather with above-average temperatures and cool breezes on October 23-24. At the same time, a dearth of rain and a long, hot, dry spell will make the Hawaiian Islands a drought area.

On the 25th, cyclone winds will suddenly strike the Colorado border area westward. From Virginia to New York, weather will be variable from the 23rd to 30th of October, with generally below average temperatures and windy. Severe snowstorms are indicated over the closing week in October for Massachusetts and Rhode Island. High winds and snows will strike Maine from the north as October closes. ■





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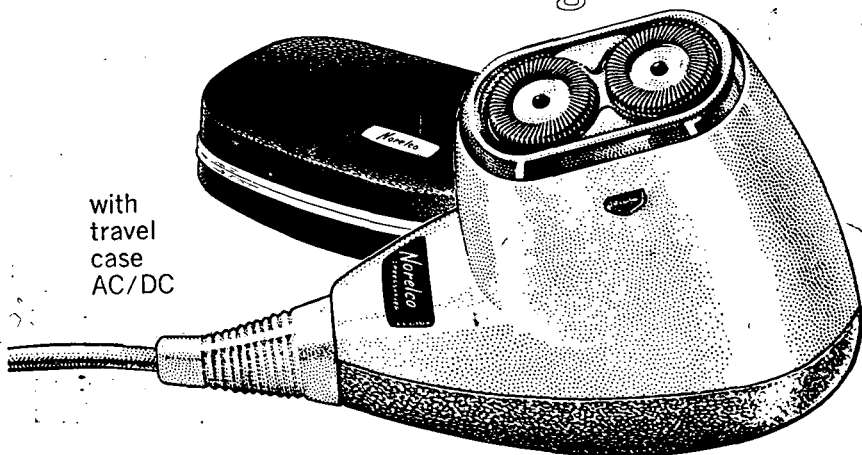
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